

# Index of Technical and Symposium Papers

## Volume 94, Part 1

### Titles

#### A

Absorption Heat Pumping for District Heating Now Practical, W.F. DAVIDSON, D.C. ERICKSON . . . . .	707
Airflow Characteristics in the Occupied Zone of Heated Spaces without Mechanical Ventilation, A.K. MELIKOV, H. HANZAWA, P.O. FANGER . . . . .	52
Alternatives for Monitoring Multidwelling Energy Measures, J.M. PORTERFIELD . . . . .	1024
Angle Factor Determination from a Person to Inclined Surfaces, M. STEINMAN, L.N. KALISPERIS, L.H. SUMMERS . . . . .	1809
Application of VAV, DDC, and Smoke Management to Hospital Nursing Wards, J.R. LEWIS . . . . .	1193
Application of Gas-Fired Desiccant Cooling Systems, B.M. COHEN, R.B. SLOSERG . . . . .	525
Artificial Intelligence in Building Control Systems, J.D. PETZE, D.R. REED . . . . .	960
Assessment of Thermally Activated Heat Pumps with Desiccant Cooling, R.H. TURNER, J.D. KLEISER, R.F. CHEN, N. DOMINGO, F. CHEN . . . . .	552

#### B

Building a Control System from the Bottom Up Using Application-Specific Controllers, J.R. SOSOKA, K.W. PETERSON . . . . .	1521
Building with Variable Thermal Performances, A. B.D. TODOROVIC, M. MITRIC, M. LIGETI . . . . .	948

#### C

Calculating Optimum Filter Change Intervals, K.M. ELOVITZ . . . . .	610
Case History—Low-Rise Office Building Using Water-Source Heat Pump, E.E. FRIBERG . . . . .	1708
Case Studies Support Adjusting Heat Loss Calculations When Sizing Gas-Fired Low-Intensity Infrared Equipment, N.A. BUCKLEY, T.P. SEE . . . . .	1848
Clothing Insulation Asymmetry and Thermal Comfort, B.W. OLESEN, Y. HASEBE, R.J. DE DEAR . . . . .	32
Cogeneration and Heat Pumps in Combination with Thermal Storage, P.J. COLLET . . . . .	1933
Cold Air Distribution, C.E. DORGAN, J.S. ELLESON . . . . .	2008
Comparative Energy Use of Vacuum, Hydro, and Forced Air Coolers for Fruits and Vegetables, J.F. THOMPSON, Y.L. CHEN . . . . .	1427
Comparison of Thermal Predictive Models for Clothed Humans, W.A. LOTENS . . . . .	1321
Comparison Testing of Solar Water-Heating Systems: Difficulties and Solutions, T.F. TIEDEMANN . . . . .	375
Comprehensive Method of Improving Part-Load Air-Conditioning Performance, A. A. SHAW, R.E. JUXTON . . . . .	442
Computer Prediction and Measurement of Comparison of Daylighting Performance in Selected Atrium Buildings Using the SERI Algorithms, L.L. BOYER, M.S. OH . . . . .	799
Control of Microbioaerosol Contamination in Critical Areas in the Hospital Environment, W.W. RHODES . . . . .	1171
Control of Thermal Output, Stack Gas Emissions, and Indoor Air Quality Influences for Conventional and Catalytic Wood Heaters, C.V. KNIGHT . . . . .	1125
Conversion of an Electric Power Plant in Des Moines to Cogeneration and District Heating, R.M. NELSON, E.O. KAINLAURI . . . . .	1947
Cooling of Strawberries in Cartons with New Vent Hole Designs, B.B. ARIFIN, K.V. CHAU . . . . .	1415
Correlation of Experimental Exit Pressures for Refrigerant Flow through a Capillary Tube Expansion Device, A. U.W. SCHULZ . . . . .	507
Correlations for Pressure Distribution on Buildings and Calculation of Natural-Ventilation Airflow, M.V. SWAMI, S. CHANDRA . . . . .	243
Corrosion, Toxicity, and Freeze Characteristics of Uninhibited Degraded Propylene Glycol for Use in Closed Loop Active Solar Systems, J.G. AVERY . . . . .	1271

#### D

Daylight Prediction and Measurement for Three-Sided Multistory Atriums under Overcast and Clear Skies, K.S. KIM, L.L. BOYER . . . . .	783
Daylighting and Thermal Performance of Roof Glazing in Atrium Spaces, The, G.L. GILLETTE, S. TREADO . . . . .	826
Decoupling Supply and Return Fans for Increased Stability of VAV Systems, L.H. ALCORN, P.J. HUBER . . . . .	1484
Desiccant Cooling R&D in Japan, K. MATSUKI, Y. SAITO . . . . .	537
Design Considerations for Fixed-Bed Metal Hydride Heat Pumps for High-Temperature Boosts, M.R. ALLY . . . . .	267
Design Criteria for Efficient and Cost Effective Forced Air Cooling Systems for Fruits and Vegetables, C.D. BAIRD, J.J. GAFFNEY, M.T. TALBOT . . . . .	1434
Determination of the Effect of Walking on the Forced Convective Heat Transfer Coefficient Using an Articulated Manikin, S.KW. CHANG, E. ARENS, R.R. GONZALEZ . . . . .	71
Development of a Radiant Heating System Model for BLAST, D.M. MALONEY, C.O. PEDERSEN, M.J. WITTE . . . . .	1795
Diagnostic Techniques for Evaluating Office Building Envelopes, A.K. PERSLY, R.A. GROT, J.B. FANG, Y.M. CHANG . . . . .	987
District Heating and Cooling with Heat Pumps Outside the United States, J.M. CALM . . . . .	754
DUBLSORB—A Universal Desiccant Hybrid Approach, W.H. WILKINSON, D.K. LANDSTROM, D. NOVOSEL . . . . .	563
Dynamic Control: Fundamentals and Considerations, T.B. HARTMAN . . . . .	599

#### E

Economics of Harvesting Thermal Storage Systems: A Case Study of a Merchandise Distribution Center, D.E. KNEBEL . . . . .	1894
Economics of Ice Storage Systems in a University Engineering Building, J.M. AYRES, H. LAU . . . . .	1905
Economics of Relief Fans Vs. Return Fans in Variable Volume Systems with Economizer Cycles, The, C.C. KALASINSKY . . . . .	1467
Effect of Behavioral Strategies and Activity on Thermal Comfort of the Elderly (RP-460), K.M. CENA, J.R. SPOTILA, E.B. RYAN . . . . .	83
Effects of Temperature Fluctuation on Transpiration of Selected Perishables: Mathematical Models and Experimental Studies (RP442), P.N. PATEL, S.K. SASTRY . . . . .	1588
Effects of Temperature, Relative Humidity and Storage Time on the Transpiration Coefficients of Selected Perishables (RP-442), P.N. PATEL, T.K. PAI, S.K. SASTRY . . . . .	1563
Efficiency Characteristics of Speed-Modulated Drives at Predicted Torque Conditions for Air-to-Air Heat Pumps, C.K. RICE . . . . .	892
Empirically Based Algorithms for Preliminary Prediction of Daylight Performance in Toplighted Atriums, L.L. BOYER, K.S. KIM . . . . .	765
Energy "Amenity": The: Heat Pumps Serve District Heating in Treatment Plant Energy Programs, D.L. SCHNEIDER, J.Q. GOSS . . . . .	741
Energy Consumption and Economic Evaluation of Thermal Storage and Recovery Systems for a Large Commercial Building, B.F. GRAY, C.A. JOHNSON, G.J. SCHOENAU, R.W. BESANT . . . . .	412
Energy Rating of Refrigerators with Variable Defrost Controls, B.M. MAHAJAN . . . . .	330
Energy Requirements for Closed Loop Storage Heat Pump Systems with Different Internal Loads for Various Geographic Locations, R.H. HOWELL . . . . .	1679
Evaluation of Computer-Based Models that Predict Human Responses to the Thermal Environment, An, R.A. HASLAM, K.C. PARSONS . . . . .	1342
Evaluation of Performance Degradation Due to Inlet Elbow Orientation on a Small Forward-Curved Centrifugal Fan, D.L. O'NEAL, N.Y. CHAN . . . . .	365
Evaluation of the Physiological Bases of Thermal Comfort Models, T.J. DOHERTY, E. ARENS . . . . .	1371
Evaporation and Condensation of Refrigerant-Oil Mixtures in a Smooth Tube and a Micro-fin Tube (RP-469), L.M. SCHLAGER, M.B. PATE, A.E. BERGLES . . . . .	149

Evaporator Performance of Two-Phase Thermosiphon Loop Heat Exchanger under Constant Heat Flux Boundary Conditions, G.D. MATHUR, T.W. McDONALD	404
Examination of Free Convection around Occupant's Body Caused by Its Metabolic Heat, H. HOMMA, M. YAKIYAMA	104
Experimental Evaluation of Three Ground-Coupled Heat Pump Systems, R.R. JOHNSON, J.A. EDWARDS, J.C. MULLIGAN, Y. MOHAMMADZADEH, P. SAFEMAZANDARANI	280
Experimental Study of Internal Flow of a Room Air Conditioner Incorporating a Cross Flow Fan, K. MATSUKI, Y. SHINOBU, A. TAKUSHIMA, S. TANAKA	350
Expert System for Building Energy Consumption Analysis: Applications at a University Campus, An, J.S. HABERL, L.K. SMITH, K.P. COONEY, F.D. STERN	1037
<b>F</b>	
Field Problems Associated with Return Fans on VAV Systems, J.P. KETTLER	1477
Field Test of a Novel Bivalent Heat Pump to Establish Heating Demand and Load Profiles, D.F. CUTHERBERT	864
Fire Department Application of Positive Pressure Ventilation, B.G. ROBERTS	1253
Five-Year Performance Results for the Dallas-Fort Worth (DFW) Airport Solar Total Energy System, M.J. O'NEILL	1261
French Office Tower Pioneers with Thermal Storage, B. COR-DAILLAT, R.T. TAMBLYN	1861
<b>G</b>	
Global Optimization of HVAC System Operations in Real Time, Z. CUMALI	1729
<b>H</b>	
Hospital Complex as a Base for District Heating, W.A. SMITH	1957
Hot Water and Energy Use in Apartment Buildings, M. PERLMAN, N.H. MILLIGAN	1087
Humidity, Comfort and Contact Lenses, J.E. LAVIANA, F.H. ROHLES, JR., P.E. BULLOCK	3
HVAC Controls in Laboratories—A Systems Approach, C.P. ANDERSEN, K.M. CUNNINGHAM	1514
<b>I</b>	
Ice Storage Application to an Illinois Hospital, D.L. GRUMMAN, A.S. BUTKUS, JR.	1879
In Situ Wood Heat Monitoring: Evaluation of Measured Heat Output and Field Efficiency, R.A. YODER, M.P. MODERA, G.A. SPOLEK	1147
In-Situ Appliance Efficiency Audit Procedures, R.F. SZYDLOWSKI, P.G. CLEARY	1007
Information-Based Smoke Control Systems, G. SHAVIT	1238
Instrumentation Applications for Commercial Building Energy Audits, H.P. MISURIELLO	973
Integrated Daylighting, Heating, and Cooling Model for Atriums, L.O. DEGELMAN, J.F. MOLINELLI, JR., K.S. KIM	812
Intelligent Building, The—An ASHRAE Opportunity, R.J. CAFFREY	925
Intelligent Buildings—Smarter with DDC, V.A. WILLIAMS	1314
Investigation of Control Alternatives for a Steam Turbine Driven Chiller, S.A. KLEIN, D.R. NUGENT, J.W. MITCHELL	627
<b>K</b>	
Knowledge-Based Front-End Input Generating Program for Building System Simulation, S.T. LIU, G.E. KELLY	1074
Knowledge Engineering for HVAC Expert Systems, P.W. BROTHERS	1063
<b>L</b>	
Laboratory Efficiency Comparisons of Modulating Heat Pump Components Using Adjustable Speed Drives, W.A. MILLER	874
Laboratory Testing of a Heat Pump System with Water-to-Water, Counterflow Heat Exchangers Using Various Compositions of an R13B1/R152a Nonazeotropic Refrigerant Mixture, E.A. VINEYARD	292
Life-Cycle Cost Analysis of Variable-Speed Pumping for Coils Application, O. AHMED	194
<b>M</b>	
Mathematical Model for the Transpiration from Fruits and Vegetables, A. (RP-370), K.V. CHAU, J.J. GAFFNEY, R.A. ROMERO	1541
Measuring the Concentration of a Flowing Oil-Refrigerant Mixture: Instrument Test Facility and Initial Results (RP-356), J.J. BAUSTIAN, M.B. PATE, A.E. BERGLES	167
Method for Characterizing the Dynamic Performance of Wall Specimens Using a Calibrated Hot Box, A. D.M. BURCH, R.R. ZARR, B.A. LICITRA	125
Method for Testing Hydronic Radiant Metal Ceiling Panels, A. B.M. OSOJNAK, R.F. BOEHM	1824
Methodology for Guidance of Power Supply in Urban Areas, D. CORAK, Z. MUZEK	1297
Methodology for Implementing a Psychrometric Chart in a Computer Graphics System, A. Z. ZHANG, M.B. PATE	2069
Microcomputer Version of a Large Mainframe Program for Use in Cogeneration Analysis, A. D.C. PEDREYRA	1617
Model of an Ammonia-Water Falling Film Absorber, A. H. PEREZ-BLANCO	467
Modeling Cogeneration Systems with DOE-2.1C, J.H. ETO, S.D. GATES	1605
Modeling of Human Performance in Hyperbaric Environments, E.H. WISSLER	1386
Modern Building Services—More than Computerized HVAC, A.D. MCKINLEY	934
Monitoring of Residential Groundwater-Source Heat Pumps in the Northeast, G.M. FREEDMAN, R.S. DOUGALL	839
<b>N</b>	
Night Picking of Fruits and Vegetables to Reduce Cooling Load, W.C. FAIRBANK	1403
<b>O</b>	
Off-Peak Desiccant Cooling and Cogeneration Combine to Maximize Gas Utilization, M. MECKLER	575
Operating Experience with a 50 MW Absorption Heat Pump, L.E. ASTRAND	716
Optimal System Choice to Provide the Energy Needs of a Large Industrial Complex, The, E.S. KULIC, S. SIRBUBALO, M. OSMANAGIC, D. MOMCINOVIC, T. SADOVIC	1307
Overview of Smoke Control Technology, An, J.H. KLOTE	1211
Overview of 3-D Graphical Analysis Using DOE-2 Hourly Simulation Data, An, J. HABERL, M. MacDONALD, A. EDEN	212
<b>P</b>	
Passive Solar Energy in Intelligent Buildings, A.H.C. VAN PAASSEN	1289
Performance Monitoring Results for Office Building Groundwater Heat Pump System, M.J. BROWN, B.J. HESSE, R.A. O'NEIL	1691
Performance of Heat Pump Reversing Valves and Comparison through Characterizing Parameters, G.D.S. DAMASCENO, W.N.T. LEE, S.P. ROOKE, V.W. GOLDSCHMIDT	304
Performance of Sunspaces in Northern Climates, P.R. BURNS, R.A. O'NEIL	381
Performance Test of a Direct Expansion Heat Pump System, J.A. EDWARDS, P. SAFEMAZANDARANI, R.R. JOHNSON, Y. MOHAMMADZADEH	318
POST: Plant Operations Simulation Template, D.R. CLARK, G.E. KELLY	1760
Pressure Drop Characteristics of Typical Stairshafts in High-Rise Buildings, G.Y. ACHAKJI, G.T. TAMURA	1223
Prospect of Incorporating Desuperheaters to Room Air Conditioners for Tropical Application, The, T.Y. BONG, M.N.A. HAWLADER, W. MAHMOOD	340
<b>Q</b>	
Quantitative Evaluation of Air Distribution in Full Scale Mock-Ups of Animal Holding Rooms, A, M.D. McDIARMID	685
<b>R</b>	
Radiant Cooling in Laboratory Animal Caging, R.B. HAYTER, R.L. GORTON	1834
Rational Considerations for Modeling Human Thermoregulation during Cold Water Immersion, P. TIKUISIS, R.R. GONZALEZ	1361
Rationalization of the Effective Temperature ET*, as a Measure of the Enthalpy of the Human Indoor Environment, A.P.R. FOBELETS, A.P. GAGGE	12
Reducing Emissions from Wood Stoves by Reducing Wood Surface Area, M.P. MODERA, F. PETERSON	1154

Refrigerant Flow through Orifices, K.I. KRAKOW, S. LIN	484
Refrigerant Leakage in Heat Pump Reversing Valves Including Comparison to Air Leakage Measurements, W.N.T. LEE, G.D.S. DAMASCENO, V.W. GOLDSCHMIDT, R.T. MARKS	458
Residential Hot Water Use in Florida and North Carolina, T.J. MERRIGAN	1099
Residential Water Heater Electrical Usage and Demand Reduction Using Reduced Element Sizes and Time Clock Controls, D.G. COLLIVER, W.E. MURPHY, J.L. TARABA	1110

## S

Second Law Efficiency and Costing Analysis of a Total Energy Plant, R.A. GAGGIOLI, L. WANG, K.-X. ZHU, J.R. TOO	1642
Secondary Combustion in a Dual-Chamber Woodstove, G.A. SPOLEK, R.E. HALL, J.H. WASSER	1138
Selecting and Sizing Outside and Return Air Dampers for VAV Economizer Systems, R.L. ALLEY	1457
Significance of Operating-Mode Flexibility in a District Heat Pump System, G. MECKLER	723
Site-Built Large Volume Solar Water Heating Systems for Commercial and Industrial Facilities, H.M. HEALEY	1277
Spot Cooling/Heating and Ventilation Effectiveness, C.E. BROWN	678
Study of Solar Insolation, A—Reno, Nevada, 1979–1985, R.B. McKEE, J.D. ARENDS, C.V. EGGSTAFF, S.C. PETERSON	425
Study of the Filling of Wall Cavities with Retrofit Wall Insulation, A, J.A. FLORES, A.R. GRILL	178
Suggested Laboratory Experiments to Support HVAC Education, H. SINGH, P. ROJESKI	2043
Surface Heat Flow in Solid Spheres with Time-Dependent Inputs, T. CEYLAN	141

## T

Test Hut Validation of a Microcomputer Predictive HVAC Control, M.M. SHAPIRO, A.J. YAGER, T.H. NGAN	644
Thermal Energy Storage With Encapsulated Ice, D.R. LABOURN	1971
Thermal Storage Retrofit Restores Dual Temperature System, G.V.R. HOLNESS	1866
Thermal Response of Houses Resulting from Heating and Cooling Interruptions, G.F. BOUFADEL, W.C. THOMAS	1745
Thermally Induced Pressure Distribution in Simulated Tall Buildings with Floor Partitions, K.H. LEE, H. TANAKA, Y. LEE	228
Throw: The Air Distribution Quantifier, D. INT-HOUT, III, J.B. WEED	667
Transpiration Coefficients for Certain Fruits and Vegetables (RP-370), K.V. CHAU, R.A. ROMERO, C.D. BAIRD, J.J. GAFFNEY	1553

## U

Use of a General Control Simulation Program, X. ZHANG, M.L. WARREN	1776
Use of Detailed Simulation for the Study of the Feasibility of Cogeneration at a University Campus, The, G.R. GUINN	1626
Use of Direct Pumping and Hydraulic Turbines in Thermal Storage Systems, The, R.K. TACKETT	1989
User Assisted Duct Design and Fan Sizing for HVAC Classes, W.E. MURPHY	2054

## V

VAV System Interactive Controls, V.A. WILLIAMS	1493
Ventilation Effectiveness and ADPI Measurements of a Forced Air Heating System, F.J. OFFERMANN, III	694
Ventilation for Protection of Immune Compromised Patients, W.A. MURRAY, A.J. STREIFEL, T.J. O'DEA, F.S. RHAME	1185
Versatile Application-Specific Controllers for Hotel Guest Rooms, S.A. MUXEN, W.F. CHAPMAN	1530

## W

Water Source Heat Pump as a Multiple Experiment HVAC Laboratory, The, S.P. KAVANAUGH	2029
What Distributed Microcontrollers Bring to the Building Management System, P.P. PAYNE	1503

## Authors

### A

ACHAKJI, G.Y., G.T. TAMURA, Pressure Drop Characteristics of Typical Stairshafts in High-Rise Buildings	1223
AHMED, O., Life-Cycle Cost Analysis of Variable-Speed Pumping for Coils Application	194
ALCORN, L.H., P.J. HUBER, Decoupling Supply and Return Fans for Increased Stability of VAV Systems	1484
ALLEY, R.L., Selecting and Sizing Outside and Return Air Dampers for VAV Economizer Systems	1457
ALLY, M.R., Design Considerations for Fixed-Bed Metal Hydride Heat Pumps for High-Temperature Boosts	267
ANDERSEN, C.P., K.M. CUNNINGHAM, HVAC Controls in Laboratories—A Systems Approach	1514
ARENDS, J.D., R.B. MCKEE, C.V. EGGSTAFF, S.C. PETERSON, A Study of Solar Insolation—Reno, Nevada, 1979–1985	425
ARENDS, E., S.KW. CHANG, R.R. GONZALEZ, Determination of the Effect of Walking on the Forced Convective Heat Transfer Coefficient Using an Articulated Manikin	71
ARENDS, E., T.J. DOHERTY, Evaluation of the Physiological Bases of Thermal Comfort Models	1371
ARIFIN, B.B., K.V. CHAU, Cooling of Strawberries in Cartons with New Vent Hole Designs	1415
ASTRAND, L.E., Operating Experience with a 50 MW Absorption Heat Pump	716
AVERY, J.G., Corrosion, Toxicity, and Freeze Characteristics of Uninhibited Degraded Propylene Glycol for Use in Closed Loop Active Solar Systems	1271
AYRES, J.M., H. LAU, Economics of Ice Storage Systems in a University Engineering Building	1905

### B

BAIRD, C.D., K.V. CHAU, R.A. ROMERO, J.J. GAFFNEY, Transpiration Coefficients for Certain Fruits and Vegetables (RP-370)	1553
BAIRD, C.D., J.J. GAFFNEY, M.T. TALBOT, Design Criteria for Efficient and Cost Effective Forced Air Cooling Systems for Fruits and Vegetables	1434
BAUSTIAN, J.J., M.B. PATE, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture: Instrument Test Facility and Initial Results (RP-356)	167
BERGLES, A.E., J.J. BAUSTIAN, M.B. PATE, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture: Instrument Test Facility and Initial Results (RP-356)	167
BERGLES, A.E., L.M. SCHLAGER, M.B. PATE, Evaporation and Condensation of Refrigerant-Oil Mixtures in a Smooth Tube and a Micro-fin Tube (RP-469)	149
BESANT, R.W., B.F. GRAY, C.A. JOHNSON, G.J. SCHOENAU, Energy Consumption and Economic Evaluation of Thermal Storage and Recovery Systems for a Large Commercial Building	412
BOEHM, R.F., B.M. OSOJNAK, A Method for Testing Hydronic Radiant Metal Ceiling Panels	1824
BONG, TY., M.N.A. HAWLADER, W. MAHMOOD, The Prospect of Incorporating Desuperheaters to Room Air-Conditioners for Tropical Application	340
BOUFADEL, G.F., W.C. THOMAS, Thermal Response of Houses Resulting from Heating and Cooling Interruptions	1745
BOYER, L.L., K.S. KIM, Daylight Prediction and Measurement for Three-Sided Multistory Atriums under Overcast and Clear Skies	783
BOYER, L.L., K.S. KIM, Empirically Based Algorithms for Preliminary Prediction of Daylight Performance in Toplighted Atriums	765
BOYER, L.L., M.S. OH, Computer Prediction and Measurement Comparison of Daylighting Performance in Selected Atrium Buildings Using the SERI Algorithms	799
BROTHERS, P.W., Knowledge Engineering for HVAC Expert Systems	1063
BROWN, C.E., Spot Cooling/Heating and Ventilation Effectiveness	678
BROWN, M.J., B.J. HESSE, R.A. O'NEIL, Performance Monitoring Results for Office Building Groundwater Heat Pump System	1691
BUCKLEY, N.A., T.P. SEEL, Case Studies Support Adjusting Heat Loss Calculations When Sizing Gas-Fired Low-Intensity Infrared Equipment	1848
BULLOCK, P.E., J.E. LAVIANA, F.H. ROHLES, JR., Humidity, Comfort and Contact Lenses	3

BURCH, D.M., R.R. ZARR, B.A. LICITRA, A Method for Characterizing the Dynamic Performance of Wall Specimens Using a Calibrated Hot Box . . . . .	125
BURNS, P.R., R.A. O'NEIL, Performance of Sunspaces in Northern Climates . . . . .	381
BUTKUS, A.S., JR., D.L. GRUMMAN, Ice Storage Application to an Illinois Hospital . . . . .	1879
<b>C</b>	
CAFFREY, R.J., The Intelligent Building—An ASHRAE Opportunity . . . . .	925
CALM, J.M., District Heating and Cooling with Heat Pumps Outside the United States . . . . .	754
CENA, K.M., J.R. SPOTILA, E.B. RYAN, Effect of Behavioral Strategies and Activity on Thermal Comfort of the Elderly (RP-460) . . . . .	83
CEYLAN, T., Surface Heat Flow in Solid Spheres with Time-Dependent Inputs . . . . .	141
CHAN, N.Y., D.L. O'NEAL, Evaluation of Performance Degradation Due to Inlet Elbow Orientation on a Small Forward-Curved Centrifugal Fan . . . . .	365
CHANDRA, S., M.V. SWAMI, Correlations for Pressure Distribution on Buildings and Calculation of Natural-Ventilation Airflow . . . . .	243
CHANG, S.KW., E. ARENS, R.R. GONZALEZ, Determination of the Effect of Walking on the Forced Convective Heat Transfer Coefficient Using an Articulated Manikin . . . . .	71
CHANG, Y.M., A.K. PERSILY, R.A. GROT, J.B. FANG, Diagnostic Techniques for Evaluating Office Building Envelopes . . . . .	987
CHAPMAN, W.F., S.A. MUXEN, Versatile Application-Specific Controllers for Hotel Guest Rooms . . . . .	1530
CHAU, K.V., B.B. ARIFIN, Cooling of Strawberries in Cartons with New Vent Hole Designs . . . . .	1415
CHAU, K.V., J.J. GAFFNEY, R.A. ROMERO, A Mathematical Model for the Transpiration from Fruits and Vegetables (RP-370) . . . . .	1541
CHAU, K.V., R.A. ROMERO, C.D. BAIRD, J.J. GAFFNEY, Transpiration Coefficients for Certain Fruits and Vegetables (RP-370) . . . . .	1553
CHEN, F., R.H. TURNER, J.D. KLEISER, R.F. CHEN, N. DOMINGO, Assessment of Thermally Activated Heat Pumps with Desiccant Cooling . . . . .	552
CHEN, R.F., R.H. TURNER, J.D. KLEISER, N. DOMINGO, F. CHEN, Assessment of Thermally Activated Heat Pumps with Desiccant Cooling . . . . .	552
CHEN, Y.L., J.F. THOMPSON, Comparative Energy Use of Vacuum, Hydro, and Forced Air Coolers for Fruits and Vegetables . . . . .	1427
CLARK, D.R., G.E. KELLY, POST: Plant Operations Simulation Template . . . . .	1760
CLEARY, P.G., R.F. SZYDLOWSKI, In-situ Appliance Efficiency Audit Procedures . . . . .	1007
COHEN, B.M., R.B. SLOSBERG, Application of Gas-Fired Desiccant Cooling Systems . . . . .	525
COLLET, P.J., Cogeneration and Heat Pumps in Combination with Thermal Storage . . . . .	1933
COLLIVER, D.G., W.E. MURPHY, J.L. TARABA, Residential Water Heater Electrical Usage and Demand Reduction Using Reduced Element Sizes and Time Clock Controls . . . . .	1110
COONEY, K.P., J.S. HABERL, L.K. SMITH, F.D. STERN, An Expert System for Building Energy Consumption Analysis: Applications at a University Campus . . . . .	1037
CORAK, D., Z. MUZEK, Methodology for Guidance of Power Supply in Urban Areas . . . . .	1297
CORDAILLAT, B., R.T. TAMBLYN, French Office Tower Pioneers with Thermal Storage . . . . .	1861
CUMALI, Z., Global Optimization of HVAC System Operations in Real Time . . . . .	1729
CUNNINGHAM, K.M., C.P. ANDERSEN, HVAC Controls in Laboratories—A Systems Approach . . . . .	1514
CUTHBERT, D.F., Field Test of a Novel Bivalent Heat Pump to Establish Heating Demand and Load Profiles . . . . .	864
<b>D</b>	
DAMASCENO, G.D.S., W.N.T. LEE, S.P. ROOKE, V.W. GOLDSCHMIDT, Performance of Heat Pump Reversing Valves and Comparison through Characterizing Parameters . . . . .	304
DAMASCENO, G.D.S., W.N.T. LEE, V.W. GOLDSCHMIDT, R.T. MARKS, Refrigerant Leakage in Heat Pump Reversing Valves Including Comparison to Air Leakage Measurements . . . . .	458
DAVIDSON, W.F., D.C. ERICKSON, Absorption Heat Pumping for District Heating Now Practical . . . . .	707
DE DEAR, R.J., B.W. OLESEN, Y. HASEBE, Clothing Insulation Asymmetry and Thermal Comfort . . . . .	32
DEGELMAN, L.O., J.F. MOLINELLI, JR., K.S. KIM, Integrated Daylighting, Heating, and Cooling Model for Atriums . . . . .	812
DOHERTY, T.J., E. ARENS, Evaluation of the Physiological Bases of Thermal Comfort Models . . . . .	1371
DOMINGO, N., R.H. TURNER, J.D. KLEISER, R.F. CHEN, F. CHEN, Assessment of Thermally Activated Heat Pumps with Desiccant Cooling . . . . .	552
DORGAN, C.E., J.S. ELLESON, Cold Air Distribution . . . . .	2008
DOUGALL, R.S., G.M. FREEDMAN, Monitoring of Residential Groundwater-Source Heat Pumps in the Northeast . . . . .	839
<b>E</b>	
EDEN, A., J. HABERL, M. MacDONALD, An Overview of 3-D Graphical Analysis Using DOE-2 Hourly Simulation Data . . . . .	212
EDWARDS, J.A., R.R. JOHNSON, J.C. MULLIGAN, Y. MOHAMMADZADEH, P. SAFEMAZANDARANI, Experimental Evaluation of Three Ground-Coupled Heat Pump Systems . . . . .	280
EDWARDS, J.A., P. SAFEMAZANDARANI, R.R. JOHNSON, Y. MOHAMMADZADEH, Performance Test of a Direct Expansion Heat Pump System . . . . .	318
EGGSTAFF, C.V., R.B. MCKEE, J.D. ARENS, S.C. PETERSON, A Study of Solar Insolation—Reno, Nevada, 1979–1985 . . . . .	425
ELLESON, J.S., C.E. DORGAN, Cold Air Distribution . . . . .	2008
ELOVITZ, K.M., Calculating Optimum Filter Change Intervals . . . . .	610
ERICKSON, D.C., W.F. DAVIDSON, Absorption Heat Pumping for District Heating Now Practical . . . . .	707
ETO, J.H., S.D. GATES, Modeling Cogeneration Systems with DOE2.1C . . . . .	1605
<b>F</b>	
FAIRBANK, W.C., Night Picking of Fruits and Vegetables to Reduce Cooling Load . . . . .	1403
FANG, J.B., A.K. PERSILY, R.A. GROT, Y.M. CHANG, Diagnostic Techniques for Evaluating Office Building Envelopes . . . . .	987
FANGER, P.O., A.K. MELIKOV, H. HANZAWA, Airflow Characteristics in the Occupied Zone of Heated Spaces without Mechanical Ventilation . . . . .	52
FLORES, J.A., A.R. GRILL, A Study of the Filling of Wall Cavities with Retrofit Wall Insulation . . . . .	178
FOBELETS, A.P.R., A.P. GAGGE, Rationalization of the Effective Temperature ET*, as a Measure of the Enthalpy of the Human Indoor Environment . . . . .	12
FREEDMAN, G.M., R.S. DOUGALL, Monitoring of Residential Groundwater-Source Heat Pumps in the Northeast . . . . .	839
FRIBERG, E.E., Case History—Low-Rise Office Building Using Water-Source Heat Pump . . . . .	1708
<b>G</b>	
GAFFNEY, J.J., C.D. BAIRD, M.T. TALBOT, Design Criteria for Efficient and Cost Effective Forced Air Cooling Systems for Fruits and Vegetables . . . . .	1434
GAFFNEY, J.J., K.V. CHAU, R.A. ROMERO, A Mathematical Model for the Transpiration from Fruits and Vegetables (RP-370) . . . . .	1541
GAFFNEY, J.J., K.V. CHAU, R.A. ROMERO, C.D. BAIRD, Transpiration Coefficients for Certain Fruits and Vegetables (RP-370) . . . . .	1553
GAGGE, A.P., A.P.R. FOBELETS, Rationalization of the Effective Temperature ET*, as a Measure of the Enthalpy of the Human Indoor Environment . . . . .	12
GAGGIOLI, R.A., L. WANG, K.-X. ZHU, J.R. TOO, Second Law Efficiency and Costing Analysis of a Total Energy Plant . . . . .	1642
GATES, S.D., J.H. ETO, Modeling Cogeneration Systems with DOE2.1C . . . . .	1605
GILLETTE, G.L., S. TREADO, The Daylighting and Thermal Performance of Roof Glazing in Atrium Spaces . . . . .	826
GOLDSCHMIDT, V.W., G.D.S. DAMASCENO, W.N.T. LEE, S.P. ROOKE, Performance of Heat Pump Reversing Valves and Comparison through Characterizing Parameters . . . . .	304
GOLDSCHMIDT, V.W., W.N.T. LEE, G.D.S. DAMASCENO, R.T. MARKS, Refrigerant Leakage in Heat Pump Reversing Valves Including Comparison to Air Leakage Measurements . . . . .	458
GONZALEZ, R.R., S.KW. CHANG, E. ARENS, Determination of the Effect of Walking on the Forced Convective Heat Transfer Coefficient Using an Articulated Manikin . . . . .	71
GONZALEZ, R.R., P. TIKUISIS, Rational Considerations for Modeling Human Thermoregulation during Cold Water Immersion . . . . .	1361
GORTON, R.L., R.B. HAYTER, Radiant Cooling in Laboratory Animal Caging . . . . .	1834

GOSS, J.O., D.L. SCHNEIDER, The Energy "Amenity": Heat Pumps Serve District Heating in Treatment Plant Energy Programs . . . . .	741
GRAY, B.F., C.A. JOHNSON, G.J. SCHOENAU, R.W. BESANT, Energy Consumption and Economic Evaluation of Thermal Storage and Recovery Systems for a Large Commercial Building . . . . .	412
GRILL, A.R., J.A. FLORES, A Study of the Filling of Wall Cavities with Retrofit Wall Insulation . . . . .	178
GROT, R.A., A.K. PERSILY, J.B. FANG, Y.M. CHANG, Diagnostic Techniques for Evaluating Office Building Envelopes . . . . .	987
GRUMMAN, D.L., A.S. BUTKUS, JR., Ice Storage Application to an Illinois Hospital . . . . .	1879
GUINN, G.R., The Use of Detailed Simulation for the Study of the Feasibility of Cogeneration at a University Campus . . . . .	1626
<b>H</b>	
HABERL, J., M. MacDONALD, A. EDEN, An Overview of 3-D Graphical Analysis Using DOE-2 Hourly Simulation Data . . . . .	212
HABERL, J.S., L.K. SMITH, K.P. COONEY, F.D. STERN, An Expert System for Building Energy Consumption Analysis: Applications at a University Campus . . . . .	1037
HALL, R.E., G.A. SPOLEK, J.H. WASSER, Secondary Combustion in a Dual-Chamber Woodstove . . . . .	1138
HANZAWA, H., A.K. MELIKOV, P.O. FANGER, Airflow Characteristics in the Occupied Zone of Heated Spaces without Mechanical Ventilation . . . . .	52
HARTMAN, T.B., Dynamic Control: Fundamentals and Considerations . . . . .	599
HASEBE, Y., B.W. OLESEN, R.J. DE DEAR, Clothing Insulation Asymmetry and Thermal Comfort . . . . .	32
HASLAM, R.A., K.C. PARSONS, An Evaluation of Computer-Based Models that Predict Human Responses to the Thermal Environment . . . . .	1342
HAWLADER, M.N.A., T.Y. BONG, W. MAHMOOD, The Prospect of Incorporating Desuperheaters to Room Air-Conditioners for Tropical Application . . . . .	340
HAYTER, R.B., R.L. GORTON, Radiant Cooling in Laboratory Animal Caging . . . . .	1834
HEALEY, H.M., Site-Built Large Volume Solar Water Heating Systems for Commercial and Industrial Facilities . . . . .	1277
HESSE, B.J., M.J. BROWN, R.A. ONEIL, Performance Monitoring Results for Office Building Groundwater Heat Pump System . . . . .	1691
HOLNESS, G.V.R., Thermal Storage Retrofit Restores Dual Temperature System . . . . .	1866
HOMMA, H., M. YAKIYAMA, Examination of Free Convection around Occupant's Body Caused by Its Metabolic Heat . . . . .	104
HOWELL, R.H., Energy Requirements for Closed Loop Storage Heat Pump Systems with Different Internal Loads for Various Geographic Locations . . . . .	1679
HUBER, P.J. L.H. ALCORN, Decoupling Supply and Return Fans for Increased Stability of VAV Systems . . . . .	1484
<b>I</b>	
INTHOUT, D., III, J.B. WEED, Throw: The Air Distribution Quantifier . . . . .	667
<b>J</b>	
JOHNSON, C.A., B.F. GRAY, G.J. SCHOENAU, R.W. BESANT, Energy Consumption and Economic Evaluation of Thermal Storage and Recovery Systems for a Large Commercial Building . . . . .	412
JOHNSON, R.R., J.A. EDWARDS, J.C. MULLIGAN, Y. MOHAMMADZADEH, P. SAFEMAZANDARANI, Experimental Evaluation of Three Ground-Coupled Heat Pump Systems . . . . .	280
JOHNSON, R.R., J.A. EDWARDS, P. SAFEMAZANDARANI, Y. MOHAMMADZADEH, Performance Test of a Direct Expansion Heat Pump System . . . . .	318
<b>K</b>	
KAINLAURI, E.O., R.M. NELSON, Conversion of an Electric Power Plant in Des Moines to Cogeneration and District Heating . . . . .	1947
KALASINSKY, C.C., The Economics of Relief Fans Vs. Return Fans in Variable Volume Systems with Economizer Cycles . . . . .	1467
KALISPERIS, L.N., M. STEINMAN, L.H. SUMMERS, Angle Factor Determination from a Person to Inclined Surfaces . . . . .	1809
KAVANAUGH, S.P., The Water Source Heat Pump as a Multiple Experiment HVAC Laboratory . . . . .	2029
KELLY, G.D., D.R. CLARK, POST: Plant Operations Simulation Template . . . . .	1760
KELLY, G.E., S.T. LIU, Knowledge-Based Front-End Input Generating Program for Building System Simulation . . . . .	1074
KETTLER, J.P., Field Problems Associated with Return Fans on VAV Systems . . . . .	1477
KIM, K.S., L.L. BOYER, Daylight Prediction and Measurement for Three-Sided Multistory Atriums under Overcast and Clear Skies . . . . .	783
KIM, K.S., L.L. BOYER, Empirically Based Algorithms for Preliminary Prediction of Daylight Performance in Toplighted Atriums . . . . .	765
KIM, K.S., L.O. DEGELMAN, J.F. MOLINELLI, JR., Integrated Daylighting, Heating, and Cooling Model for Atriums . . . . .	812
KLEIN, S.A., D.R. NUGENT, J.W. MITCHELL, Investigation of Control Alternatives for a Steam Turbine Driven Chiller . . . . .	627
KLEISER, J.D., R.H. TURNER, R.F. CHEN, N. DOMINGO, F. CHEN, Assessment of Thermally Activated Heat Pumps with Desiccant Cooling . . . . .	552
KLOTE, J.H., An Overview of Smoke Control Technology . . . . .	1211
KNEBEL, D.E., Economics of Harvesting Thermal Storage Systems: A Case Study of a Merchandise Distribution Center . . . . .	1894
KNIGHT, C.V., Control of Thermal Output, Stack Gas Emissions, and Indoor Air Quality Influences for Conventional and Catalytic Wood Heaters . . . . .	1125
KRAKOW, K.I., S. LIN, Refrigerant Flow through Orifices . . . . .	484
KULIC, E.S., S. SIRBUBALO, M. OSMANAGIC, D. MOMCINOVIC, T. SADOVIC, The Optimal System Choice to Provide the Energy Needs of a Large Industrial Complex . . . . .	1307
<b>L</b>	
LANDSTROM, D.K., W.H. WILKINSON, D. NOVOSEL, DUBLSORB—A Universal Desiccant Hybrid Approach . . . . .	563
LAU, H., J.M. AYRES, Economics of Ice Storage Systems in a University Engineering Building . . . . .	1905
LAVIANA, J.E., F.H. ROHLES, JR., P.E. BULLOCK, Humidity, Comfort and Contact Lenses . . . . .	3
LAYBOURN, D.R., Thermal Energy Storage With Encapsulated Ice . . . . .	1971
LEE, K.H., H. TANAKA, Y. LEE, Thermally Induced Pressure Distribution in Simulated Tall Buildings with Floor Partitions . . . . .	228
LEE, Y., K.H. LEE, H. TANAKA, Thermally Induced Pressure Distribution in Simulated Tall Buildings with Floor Partitions . . . . .	228
LEE, W.N.T., G.D.S. DAMASCENO, V.W. GOLDSCHMIDT, R.T. MARKS, Refrigerant Leakage in Heat Pump Reversing Valves Including Comparison to Air Leakage Measurements . . . . .	458
LEE, W.N.T., G.D.S. DAMASCENO, S.P. ROOKE, V.W. GOLDSCHMIDT, Performance of Heat Pump Reversing Valves and Comparison through Characterizing Parameters . . . . .	304
LEWIS, J.R., Application of VAV, DDC, and Smoke Management to Hospital Nursing Wards . . . . .	1193
LICITRA, B.A., D.M. BURCH, R.R. ZARR, A Method for Characterizing the Dynamic Performance of Wall Specimens Using a Calibrated Hot Box . . . . .	125
LIGETI, M., B.D. TODOROVIC, M. MITRIC, A Building with Variable Thermal Performances . . . . .	948
LIN, S., K.I. KRAKOW, Refrigerant Flow through Orifices . . . . .	484
LIU, S.T., G.E. KELLY, Knowledge-Based Front-End Input Generating Program for Building System Simulation . . . . .	1074
LOTENS, W.A., Comparison of Thermal Predictive Models for Clothed Humans . . . . .	1321
LUXTON, R.E., A. SHAW, A Comprehensive Method of Improving Part-Load Air-Conditioning Performance . . . . .	442
<b>M</b>	
MacDONALD, M., J. HABERL, A. EDEN, An Overview of 3-D Graphical Analysis Using DOE-2 Hourly Simulation Data . . . . .	212
MAHAJAN, B.M., Energy Rating of Refrigerators with Variable Defrost Controls . . . . .	330
MAHMOOD, W., T.Y. BONG, M.N.A. HAWLADER, The Prospect of Incorporating Desuperheaters to Room Air-Conditioners for Tropical Application . . . . .	340
MALONEY, D.M., C.O. PEDERSEN, M.J. WITTE, Development of a Radiant Heating System Model for BLAST . . . . .	1795
MARKS, R.T., W.N.T. LEE, G.D.S. DAMASCENO, V.W. GOLDSCHMIDT, Refrigerant Leakage in Heat Pump Reversing Valves Including Comparison to Air Leakage Measurements . . . . .	458

MATHUR, G.D., T.W. McDONALD, Evaporator Performance of Two-Phase Thermosiphon Loop Heat Exchangers under Constant Heat Flux Boundary Conditions . . . . .	404
MATSUKI, K., Y. SAITO, Desiccant Cooling R&D in Japan . . . . .	537
MATSUKI, K., Y. SHINOBU, A. TAKUSHIMA, S. TANAKA, Experimental Study of Internal Flow of a Room Air Conditioner Incorporating a Cross Flow Fan . . . . .	350
McDIARMID, M.D., A Quantitative Evaluation of Air Distribution in Full Scale Mock-Ups of Animal Holding Rooms . . . . .	685
McDONALD, T.W., G.D. MATHUR, Evaporator Performance of Two-Phase Thermosiphon Loop Heat Exchangers under Constant Heat Flux Boundary Conditions . . . . .	404
MCKEE, R.B., J.D. AREND'S, C.V. EGGSTAFF, S.C. PETERSON, A Study of Solar Insolation—Reno, Nevada, 1979-1985 . . . . .	425
MCKINLEY, A.D., Modern Building Services—More than Computerized HVAC . . . . .	934
MECKLER, M., Off-Peak Desiccant Cooling and Cogeneration Combine to Maximize Gas Utilization . . . . .	575
MECKLER, G., Significance of Operating-Mode Flexibility in a District Heat Pump System . . . . .	723
MELIKOV, A.K., H. HANZAWA, P.O. FANGER, Airflow Characteristics in the Occupied Zone of Heated Spaces without Mechanical Ventilation . . . . .	52
MERRIGAN, T.J., Residential Hot Water Use in Florida and North Carolina . . . . .	1099
MILLER, W.A., Laboratory Efficiency Comparisons of Modulating Heat Pump Components Using Adjustable Speed Drives . . . . .	874
MILLIGAN, N.H., M. PERLMAN, Hot Water and Energy Use in Apartment Buildings . . . . .	1087
MISURIELLO, H.P., Instrumentation Applications for Commercial Building Energy Audits . . . . .	973
MITCHELL, J.W., S.A. KLEIN, D.R. NUGENT, Investigation of Control Alternatives for a Steam Turbine Driven Chiller . . . . .	627
MITRIC, M., B.D. TODOROVIC, M. LIGETI, A Building with Variable Thermal Performances . . . . .	948
MODERA, M.P., F. PETERSON, Reducing Emissions from Wood Stoves by Reducing Wood Surface Area . . . . .	1154
MODERA, M.P., R.A. YODER, G.A. SPOLEK, In Situ Wood Heat Monitoring: Evaluation of Measured Heat Output and Field Efficiency . . . . .	1147
MOHAMMADZADEH, Y., J.A. EDWARDS, P. SAFEMAZANDARANI, R.R. JOHNSON, Performance Test of a Direct Expansion Heat Pump System . . . . .	318
MOHAMMADZADEH, Y., R.R. JOHNSON, J.A. EDWARDS, J.C. MULLIGAN, P. SAFEMAZANDARANI, Experimental Evaluation of Three Ground-Coupled Heat Pump Systems . . . . .	280
MOLINELLI, J.F., JR., L.O. DEGELMAN, K.-S. KIM, Integrated Daylighting, Heating, and Cooling Model for Atriums . . . . .	812
MOMCINOVIĆ, D., E.S. KULIĆ, S. SIRBUBALO, M. OSMANAGIĆ, T. SADOVIĆ, The Optimal System Choice to Provide the Energy Needs of a Large Industrial Complex . . . . .	1307
MULLIGAN, J.C., R.R. JOHNSON, J.A. EDWARDS, Y. MOHAMMADZADEH, P. SAFEMAZANDARANI, Experimental Evaluation of Three Ground-Coupled Heat Pump Systems . . . . .	280
MURPHY, W.E., User Assisted Duct Design and Fan Sizing for HVAC Classes . . . . .	2054
MURPHY, W.E., D.G. COLLIVER, J.L. TARABA, Residential Water Heater Electrical Usage and Demand Reduction Using Reduced Element Sizes and Time Clock Controls . . . . .	1110
MURRAY, W.A., A.J. STREIFEL, T.J. O'DEA, F.S. RHAME, Ventilation for Protection of Immune Compromised Patients . . . . .	1185
MUXEN, S.A., W.F. CHAPMAN, Versatile Application-Specific Controllers for Hotel Guest Rooms . . . . .	1530
MUZEK, Z., D. CORAK, Methodology for Guidance of Power Supply in Urban Areas . . . . .	1297
<b>N</b>	
NELSON, R.M., E.O. KAINLAURI, Conversion of an Electric Power Plant in Des Moines to Cogeneration and District Heating . . . . .	1947
NGAN, T.H., M.M. SHAPIRO, A.J. YAGER, Test Hut Validation of a Microcomputer Predictive HVAC Control . . . . .	644
NOVOSEL, D., W.H. WILKINSON, D.K. LANDSTROM, DUBLSORB—A Universal Desiccant Hybrid Approach . . . . .	563
NUGENT, D.R., S.A. KLEIN, J.W. MITCHELL, Investigation of Control Alternatives for a Steam Turbine Driven Chiller . . . . .	627
<b>O</b>	
O'DEA, T.J., W.A. MURRAY, A.J. STREIFEL, F.S. RHAME, Ventilation for Protection of Immune Compromised Patients . . . . .	1185
O'NEAL, D.L., N.Y. CHAN, Evaluation of Performance Degradation Due to Inlet Elbow Orientation on a Small Forward-Curved Centrifugal Fan . . . . .	365
O'NEIL, R.A., M.J. BROWN, B.J. HESSE, Performance Monitoring Results for Office Building Groundwater Heat Pump System . . . . .	1691
O'NEIL, R.A., P.R. BURNS, Performance of Sunspaces in Northern Climates . . . . .	381
O'NEILL, M.J., Five-Year Performance Results for the Dallas-Fort Worth (DFW) Airport Solar Total Energy System . . . . .	1261
OFFERMANN, F.J., III, Ventilation Effectiveness and ADPI Measurements of a Forced Air Heating System . . . . .	694
OH, M.S., L.L. BOYER, Computer Prediction and Measurement Comparison of Daylighting Performance in Selected Atrium Buildings Using the SERI Algorithms . . . . .	799
OLESEN, B.W., Y. HASEBE, R.J. DE DEAR, Clothing Insulation Asymmetry and Thermal Comfort . . . . .	32
OSMANAGIĆ, M., E.S. KULIĆ, S. SIRBUBALO, D. MOMCINOVIĆ, T. SADOVIĆ, The Optimal System Choice to Provide the Energy Needs of a Large Industrial Complex . . . . .	1307
OSOJNAK, B.M., R.F. BOEHM, A Method for Testing Hydronic Radiant Metal Ceiling Panels . . . . .	1824
<b>P</b>	
PAI, T.K., P.N. PATEL, S.K. SASTRY, Effects of Temperature, Relative Humidity and Storage Time on the Transpiration Coefficients of Selected Perishables (RP-442) . . . . .	1563
PARSONS, K.C., R.A. HASLAM, An Evaluation of Computer-Based Models that Predict Human Responses to the Thermal Environment . . . . .	1342
PATE, M.B., J.J. BAUSTIAN, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture: Instrument Test Facility and Initial Results (RP-356) . . . . .	167
PATE, M.B., L.M. SCHLAGER, A.E. BERGLES, Evaporation and Condensation of Refrigerant-Oil Mixtures in a Smooth Tube and a Micro-fin Tube (RP-469) . . . . .	149
PATE, M.B., Z. ZHANG, A Methodology for Implementing a Psychrometric Chart in a Computer Graphics System . . . . .	2069
PATEL, P.N., S.K. SASTRY, Effects of Temperature Fluctuation on Transpiration of Selected Perishables: Mathematical Models and Experimental Studies (RP-442) . . . . .	1588
PATEL, P.N., T.K. PAI, S.K. SASTRY, Effects of Temperature, Relative Humidity and Storage Time on the Transpiration Coefficients of Selected Perishables (RP-442) . . . . .	1563
PAYNE, P.P., What Distributed Microcontrollers Bring to the Building Management System . . . . .	1503
PEDERSEN, C.O., D.M. MALONEY, M.J. WITTE, Development of a Radiant Heating System Model for BLAST . . . . .	1795
PEDREYRA, D.C., A Microcomputer Version of a Large Mainframe Program for Use in Cogeneration Analysis . . . . .	1617
PEREZ-BLANCO, H., A Model of an Ammonia-Water Falling Film Absorber . . . . .	467
PERLMAN, M., N.H. MILLIGAN, Hot Water and Energy Use in Apartment Buildings . . . . .	1087
PERSILY, A.K., R.A. GROT, J.B. FANG, Y.M. CHANG, Diagnostic Techniques for Evaluating Office Building Envelopes . . . . .	987
PETERSON, F., M.P. MODERA, Reducing Emissions from Wood Stoves by Reducing Wood Surface Area . . . . .	1154
PETERSON, K.W., J.R. SOSOKA, Building a Control System from the Bottom Up Using Application-Specific Controllers . . . . .	1521
PETERSON, S.C., R.B. MCKEE, J.D. AREND'S, C.V. EGGSTAFF, A Study of Solar Insolation—Reno, Nevada, 1979-1985 . . . . .	425
PETZE, J.D., D.R. REED, Artificial Intelligence in Building Control Systems . . . . .	960
PORTERFIELD, J.M., Alternatives for Monitoring Multidwelling Energy Measures . . . . .	1024
<b>R</b>	
REED, D.R., J.D. PETZE, Artificial Intelligence in Building Control Systems . . . . .	960
RHAME, F.S., W.A. MURRAY, A.J. STREIFEL, T.J. O'DEA, Ventilation for Protection of Immune Compromised Patients . . . . .	1185

RHODES, W.W., Control of Microbioaerosol Contamination in Critical Areas in the Hospital Environment	1171
RICE, C.K., Efficiency Characteristics of Speed-Modulated Drives at Predicted Torque Conditions for Air-to-Air Heat Pumps	892
ROBERTS, B.G., Fire Department Application of Positive Pressure Ventilation	1253
ROHLES, F.H., JR., J.E. LAVIANA, P.E. BULLOCK, Humidity, Comfort and Contact Lenses	3
ROJESKI, P., H. SINGH, Suggested Laboratory Experiments to Support HVAC Education	2043
ROMERO, F.A., K.V. CHAU, J.J. GAFFNEY, A Mathematical Model for the Transpiration from Fruits and Vegetables (RP-370)	1541
ROMERO, R.A., K.V. CHAU, C.D. BAIRD, J.J. GAFFNEY, Transpiration Coefficients for Certain Fruits and Vegetables (RP-370)	1553
ROOKE, S.P., G.D.S. DAMASCENO, W.N.T. LEE, V.W. GOLDSCHMIDT, Performance of Heat Pump Reversing Valves and Comparison through Characterizing Parameters	304
RYAN, E.B., K.M. CENA, J.R. SPOTILA, Effect of Behavioral Strategies and Activity on Thermal Comfort of the Elderly (RP-460)	83
<b>S</b>	
SADOVIC, T., E.S. KULIC, S. SIRBUBALO, M. OSMANAGIC, D. MOMCINOVIC, The Optimal System Choice to Provide the Energy Needs of a Large Industrial Complex	1307
SAFEMAZANDARANI, P., J.A. EDWARDS, R.R. JOHNSON, Y. MOHAMMADZADEH, Performance Test of a Direct Expansion Heat Pump System	318
SAFEMAZANDARANI, P., R.R. JOHNSON, J.A. EDWARDS, J.C. MULLIGAN, Y. MOHAMMADZADEH, Experimental Evaluation of Three Ground-Coupled Heat Pump Systems	280
SAITO, Y., K. MATSUKI, Desiccant Cooling R&D in Japan	537
SASTRY, S.K., P.N. PATEL, Effects of Temperature Fluctuation on Transpiration of Selected Perishables: Mathematical Models and Experimental Studies (RP-442)	1588
SASTRY, S.K., P.N. PATEL, T.K. PAI, Effects of Temperature, Relative Humidity and Storage Time on the Transpiration Coefficients of Selected Perishables (RP-442)	1563
SCHLAGER, L.M., M.B. PATE, A.E. BERGLES, Evaporation and Condensation of Refrigerant-Oil Mixtures in a Smooth Tube and a Micro-fin Tube (RP-469)	149
SCHNEIDER, D.L., J.O. GOSS, The Energy "Amenity": Heat Pumps Serve District Heating in Treatment Plant Energy Programs	741
SCHOENAU, G.J., B.F. GRAY, C.A. JOHNSON, R.W. BESANT, Energy Consumption and Economic Evaluation of Thermal Storage and Recovery Systems for a Large Commercial Building	412
SCHULZ, U.W., A Correlation of Experimental Exit Pressures for Refrigerant Flow through a Capillary Tube Expansion Device	507
SEEL, T.P., N.A. BUCKLEY, Case Studies Support Adjusting Heat Loss Calculations When Sizing Gas-Fired Low-Intensity Infrared Equipment	1848
SHAPIRO, M.M., A.J. YAGER, T.H. NGAN, Test Hut Validation of a Microcomputer Predictive HVAC Control	644
SHAVIT, G., Information-Based Smoke Control Systems	1238
SHAW, A., R.E. LUXTON, A Comprehensive Method of Improving Part-Load Air-Conditioning Performance	442
SHINOBU, Y., K. MATSUKI, A. TAKUSHIMA, S. TANAKA, Experimental Study of Internal Flow of a Room Air Conditioner Incorporating a Cross Flow Fan	350
SINGH, H., P. ROJESKI, Suggested Laboratory Experiments to Support HVAC Education	2043
SIRBUBALO, S., E.S. KULIC, M. OSMANAGIC, D. MOMCINOVIC, T. SADOVIC, The Optimal System Choice to Provide the Energy Needs of a Large Industrial Complex	1307
SLOSERG, R.B., B.M. COHEN, Application of Gas-Fired Desiccant Cooling Systems	525
SMITH, L.K., J.S. HABERL, K.P. COONEY, F.D. STERN, An Expert System for Building Energy Consumption Analysis: Applications at a University Campus	1037
SMITH, W.A., Hospital Complex as a Base for District Heating	1957
SOSOKA, J.R., K.W. PETERSON, Building a Control System from the Bottom Up Using Application-Specific Controllers	1521
SPOLEK, G.A., R.E. HALL, J.H. WASSER, Secondary Combustion in a Dual-Chamber Woodstove	1138
SPOLEK, M.P., R.A. YODER, M.P. MODERA, In Situ Wood Heat Monitoring: Evaluation of Measured Heat Output and Field Efficiency	1147
SPOTILA, J.R., K.M. CENA, E.B. RYAN, Effect of Behavioral Strategies and Activity on Thermal Comfort of the Elderly (RP-460)	83
STEINMAN, M., L.N. KALISPERIS, L.H. SUMMERS, Angle Factor Determination from a Person to Inclined Surfaces	1809
STERN, F.D., J.S. HABERL, L.K. SMITH, K.P. COONEY, An Expert System for Building Energy Consumption Analysis: Applications at a University Campus	1037
STREIFEL, A.J., W.A. MURRAY, T.J. O'DEA, F.S. RHAME, Ventilation for Protection of Immune Compromised Patients	1185
SUMMERS, L.H., M. STEINMAN, L.N. KALISPERIS, Angle Factor Determination from a Person to Inclined Surfaces	1809
SWAMI, M.V., S. CHANDRA, Correlations for Pressure Distribution on Buildings and Calculation of Natural Ventilation Airflow	243
SZYDLOWSKI, R.F., P.G. CLEARY, In-situ Appliance Efficiency Audit Procedures	1007
<b>T</b>	
TACKETT, R.K., The Use of Direct Pumping and Hydraulic Turbines in Thermal Storage Systems	1989
TAKUSHIMA, A., K. MATSUKI, Y. SHINOBU, S. TANAKA, Experimental Study of Internal Flow of a Room Air Conditioner Incorporating a Cross Flow Fan	350
TALBOT, M.T., C.D. BAIRD, J.J. GAFFNEY, Design Criteria for Efficient and Cost Effective Forced Air Cooling Systems for Fruits and Vegetables	1434
TAMBLYN, R.T., B. CORDAILLAT, French Office Tower Pioneers with Thermal Storage	1861
TAMURA, G.T., G.Y. ACHAKJI, Pressure Drop Characteristics of Typical Stairshafts in High-Rise Buildings	1223
TANAKA, H., K.H. LEE, Y. LEE, Thermally Induced Pressure Distribution in Simulated Tall Buildings with Floor Partitions	228
TANAKA, S., K. MATSUKI, Y. SHINOBU, A. TAKUSHIMA, Experimental Study of Internal Flow of a Room Air Conditioner Incorporating a Cross Flow Fan	350
TARABA, J.L., D.G. COLLIVER, W.E. MURPHY, Residential Water Heater Electrical Usage and Demand Reduction Using Reduced Element Sizes and Time Clock Controls	1110
THOMAS, W.C., G.F. BOUADEL, Thermal Response of Houses Resulting from Heating and Cooling Interruptions	1745
THOMPSON, J.F., Y.L. CHEN, Comparative Energy Use of Vacuum, Hydro, and Forced Air Coolers for Fruits and Vegetables	1427
TIEDEMANN, T.F., Comparison Testing of Solar Water-Heating Systems: Difficulties and Solutions	375
TIKUISIS, P., R.R. GONZALEZ, Rational Considerations for Modeling Human Thermoregulation during Cold Water Immersion	1361
TODOROVIC, B.D., M. MITRIC, M. LIGETI, A Building with Variable Thermal Performances	948
TOO, J.R., R.A. GAGGIOLI, L. WANG, K.-X. ZHU, Second Law Efficiency and Costing Analysis of a Total Energy Plant	1642
TREADO, S., G.L. GILLETTE, The Daylighting and Thermal Performance of Roof Glazing in Atrium Spaces	826
TURNER, R.H., J.D. KLEISER, R.F. CHEN, N. DOMINGO, F. CHEN, Assessment of Thermally Activated Heat Pumps with Desiccant Cooling	552
<b>V</b>	
VAN PAASSEN, A.H.C., Passive Solar Energy in Intelligent Buildings	1289
VINEYARD, E.A., Laboratory Testing of a Heat Pump System with Water-to-Water, Counterflow Heat Exchangers Using Various Compositions of an R13B1/R152a Nonazeotropic Refrigerant Mixture	292
<b>W</b>	
WANG, L., R.A. GAGGIOLI, K.-X. ZHU, J.R. TOO, Second Law Efficiency and Costing Analysis of a Total Energy Plant	1642
WARREN, M.L., X. ZHANG, Use of a General Control Simulation Program	1776
WASSER, J.H., G.A. SPOLEK, R.E. HALL, Secondary Combustion in a Dual-Chamber Woodstove	1138
WEED, J.B., D. INT-HOUT, III, Throw: The Air Distribution Quantifier	667
WILKINSON, W.H., D.K. LANDSTROM, D. NOVOSEL, DUBLSORB—A Universal Desiccant Hybrid Approach	563
WILLIAMS, V.A., Intelligent Buildings—Smarter with DDC	1314
WILLIAMS, V.A., VAV System Interactive Controls	1493
WISSLER, E.H., Modeling of Human Performance in Hyperbaric Environments	1386
WITTE, M.J., D.M. MALONEY, C.O. PEDERSEN, Development of a Radiant Heating System Model for BLAST	1795

## Y

- YAGER, A.J., M.M. SHAPIRO, T.H. NGAN, Test Hut Validation of a Microcomputer Predictive HVAC Control ..... 644  
YAKIYAMA, M., H. HOMMA, Examination of Free Convection around Occupant's Body Caused by Its Metabolic Heat ..... 104  
YODER, R.A., M.P. MODERA, G.A. SPOLEK, In Situ Wood Heat Monitoring: Evaluation of Measured Heat Output and Field Efficiency ..... 1147

## Z

- ZARR, R.R., D.M. BURCH, B.A. LICITRA, A Method for Characterizing the Dynamic Performance of Wall Specimens Using a Calibrated Hot Box ..... 125  
ZHANG, X., M.L. WARREN, Use of a General Control Simulation Program ..... 1776  
ZHANG, Z., M.B. PATE, A Methodology for Implementing a Psychrometric Chart in a Computer Graphics System ..... 2069  
ZHU, K.-X., R.A. GAGGIOLI, L. WANG, J.R. TOO, Second Law Efficiency and Costing Analysis of a Total Energy Plant ..... 1642

# Index of Technical and Symposium Papers

## Volume 94, Part 2

### **Titles**

#### **A**

ACCURACY—A Program for Combined Problems of Energy Analysis, Indoor Airflow, and Air Quality, C. QINGYAN, J. VAN DER KOOI .....	196
Air Filter Particle-Size Efficiency Testing for Diameters Greater than 1 Micrometer, D.S. ENSOR, J.T. HANLEY, L.E. SPARKS .....	1859
Analysis of a Vapor-Compression Refrigeration System with Mechanical Subcooling, R.J. COUVILLION, M.W. LARSON, M.H. SOMERVILLE .....	641
Analysis of Commercial Whole-Building 15-Minute-Interval Electric Load Data, H. AKBARI, K.E. HEINEMEIER, D. FLORA, P. LECONIAC .....	855
Analysis of Design Options to Improve the Efficiency of Refrigerator-Freezers and Freezers, I. TURIEL, A. HEYDARI .....	1699
Analysis of Seven Thermal Bridges Identified in a Commercial Building, K.W. CHILDS .....	1776
Analytical Calculation Procedure for Underground Heat Losses, M. KRARTI, D.E. CLARIDGE .....	1003
Application Layer Communication Protocols for Building Energy Management and Control Systems, S.T. BUSHBY .....	494
Application of Constant Speed Pumps to Variable Volume Systems, W.C. STETHEM .....	1458

#### **B**

Basis and Formalism of Room Weighting Factors—Thermal Discrete Transfer Functions of a Single Zone Model, D.H. EUNILKIM .....	215
---	-----

#### **C**

Calculation of Building Foundation Heat Loss Using Superposition and Numerical Scaling, L.S. SHEN, J. POLIAKOVA, Y.J. HUANG .....	917
Calculation of Wind Effect on Ventilation, The, M.W. LID-DAMENT .....	1645
Case Study of a Commercial Conservation Retrofit: Measured Results from a Grocery Store, V.T. WONG .....	888
Classification of 200,640 Parametric Zones for Cooling Load Calculations (RP-472), E.F. SOWELL .....	754
Comparison of Cooling Thermal Storage and Gas Air Conditioning for a Lab Building, A., V.A. NEUMAN, F. SAJED, H.M. GUVEN .....	452
Computer Software in HVAC Education: A Case Study, R. RADERMACHER, K.E. HEROLD .....	1478
Condensation Heat Transfer Enhancement by Doubly Augmented Tubes, N. KAUSHIK, N.Z. AZER .....	1159
Correlations for Heat Transfer and Pressure Drop Factors for Direct Expansion Air Cooling and Dehumidifying Coils, M. TURAGA, S. LIN, P.P. FAZIO .....	616
Cross-Check and Modification of the DOE-2 Program for Calculation of Zone Weighting Factors (RP-472), E.F. SOWELL .....	737
Current Demand for HVAC&R Graduates, D.B. MEREDITH .....	1400

#### **D**

DDC Systems for Pressurization, Fume Hood Face Velocity and Temperature Control in Variable Air Volume Laboratories, C.W. MARSH .....	1947
---	------

Design Guidelines for Use of an Economizer with Heat Recovery, H.J. SAUER, JR., R.H. HOWELL .....	1877
Design Models to Handle Radiative and Convective Exchange in a Room, M.G. DAVIES .....	173
Design of a Run-Around Heat Recovery System, The, B.I. FORSYTH, R.W. BESANT .....	511
Determination of Conservation Potential Through End-Use Metering for a Wisconsin Utility's "Smart Money Program", E.A. ROGERS, D.F. RECK .....	872
Development and Use of a Window Field Comparison Facility, T.C. LEXEN .....	1338
Development of an Optimal Control System for Window Shading Devices Based on Investigations in Office Buildings, The, T. INOUE, T. KAWASE, T. IBAMOTO, S. TAKAKUSA, Y. MATSUO .....	1034
Development of Improved Ice-Making Techniques for Storage Heat Pumps (RP-483), W.E. STEWART, JR., C.L.G. DONA .....	419
 <b>E</b>	
Economic Optimization of Building Foundation Insulation Levels, D.S. PARKER, J.C. CARMODY .....	959
Economics, Testing, and Evaluation of an Exhaust Air Heat Pump for R-2000 (Tight) Houses, J.W. LINTON .....	28
Effect of Axial Spacing Variation of Underground Pipe Loop on Condenser Heat Transfer, S.F. MOUJAES, R. CROWLEY .....	46
Effect of Filtration on Particle Size Distribution, B.C. KRAFT-HEFER .....	1866
Effects of Ambient Temperature, Ambient Humidity, and Door Openings on Energy Consumption of a Household Refrigerator-Freezer, M.S. ALISSI, S. RAMADHYANI, R.J. SCHÖNHALS .....	1713
Effects of Surrounding Buildings on Wind Pressure Distributions and Natural Ventilation in Long Building Rows, The, F.S. BAUMAN, D.R. ERNEST, E.A. ARENS .....	1670
Efficient Integration of Desiccant Cooling in Commercial HVAC Systems, G. MECKLER .....	2033
Energy Optimization in a Hospital by Means of DDC, N.A. DEGUNDA .....	1969
Energy Performance of Office Buildings in Singapore, Y.W. WONG .....	546
Energy Use of Residential Refrigerators: A Comparison of Laboratory and Field Use, A.K. MEIER, K.E. HEINEMEIER .....	1737
Estimated Temperature Performance for Evaporative Cooling Systems in Five Locations in the United States, C.H. McCLELLAN .....	1071
Estimating Hot Water Use in Existing Commercial Buildings, S.C. CARPENTER, J.P. KOKKO .....	3
Evaluation of Evaporative Cooling for Dairy Cattle in Arid Climates, A.M. WAKED .....	57
Evaporation and Condensation of Refrigerant-Oil Mixtures in a Low-Fin Tube, L.M. SCHLAGER, M.B. PATE, A.E. BERGLES .....	1176
Evolution of HVAC Education at One University, H.J. SAUER, R.H. HOWELL .....	1370
Exergy-Enthalpy Diagrams of R-503 and R-502 and Their Application, F. DE'ROSSI, O. MANCA, R. MASTRULLO, P. MAZZEI .....	2045
Experience with Economizer Applications in Heat Recovery-Heat Pump Systems: The Positive and the Negative, A.I. McFARLAN .....	1918
Experimental and Numerical Modeling of a Roof-Spray Cooling System, An, S. SOMASUNDARAM, A.D. CARRASCO .....	1081
Experimental Laboratory Investigation of Second Law Analysis of a Vapor-Compression Heat Pump, An, R.R. CRAWFORD .....	1491

<b>F</b>	
Fallacy of the Static Regain Duct Design Method (RP-516), R.J. TSAL, H.F. BEHLS .....	76
Field Study of Thermal Environments and Comfort in Office Buildings, A (RP-462), G.E. SCHILLER, E.A. ARENS, F.S. BAUMAN, C. BENTON, M. FOUNTAIN, T. DOHERTY, AND K. CRAIK .....	280
Filter Testing with Submicrometer Aerosols, R.J. REMIARZ, B.R. JOHNSON, J.K. AGARWAL .....	1850
Forced Convection Condensation of Ammonia inside Coiled Fluted Tubes, G. ANAND, R.N. CHRISTENSEN, D.E. RICHARDS .....	1132
Foundation Futures: Energy Saving Opportunities Offered by ASHRAE Standard 90.2P, J.E. CHRISTIAN .....	979
<b>G</b>	
General Heat Transfer Correlation for Condensation Inside Internally Finned Tubes, A. N. KAUSHIK, N.Z. AZER .....	1579
Glazing System U-Value Measurement Using a Guarded Heater Plate Apparatus, J.L. WRIGHT, H.F. SULLIVAN .....	2024
<b>H</b>	
Heat Flow through a Roof Insulation Having Moisture Contents between 0 and 1/by Volume, in Summer, C.P. HEDLIN .....	1427
High-Efficiency Regenerative Zeolite Heat Pump, D.I. TCHERENEV, D.T. EMERSON .....	331
High Temperature Rise Piping Design for Variable Volume Systems: Key to Chiller Energy Management, G.F. MANNION .....	1325
HVAC Costs of Increased Fresh Air Ventilation Rates in Office Buildings, The, J.H. ETO, C. MEYER .....	1595
<b>I</b>	
Impact of Surface Reflectance on the Thermal Performance of Roofs: An Experimental Study, The, E.I. GRIGGS, P.H. SHIPP .....	1626
Improved Model for the Design of Plain Tube Air Cooling and Dehumidifying Coils, An, W.A. KAMAL, M.A. HASSAB .....	792
Improving HVAC Education—A Case Study, S.A. SHERIF, S. SENGUPTA, S. KAKAC, T. OLSEN .....	1390
Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings, An, R. SULLIVAN, D.K. ARASTEH, K.M. PAPAMICHAEL, J.J. KIM, R.L. JOHNSON, S.E. SELKOWITZ, R. MCCUNEY .....	1119
Influence of Expansion Device on the Performance of an Air-Conditioner with a Desuperheater, T.Y. BONG, M.N.A. HAWLADER, W. MAHMOOD .....	560
Influence of the Refrigerant Charge on the Functioning of Small Refrigerating Appliances, The, L.J.M. KUIJPERS, M.J.P. JANSEN, P.J.M. VERBOVEN .....	432
Instructional Use of a Simplified Building Energy Analysis Computational Model, M.M. OHADI, J.R. MEYER, C.F. JACOBS .....	1301
Interpretation and Use of Air Filter Particle-Size-Efficiency Data for General-Ventilation Applications, R.D. RIVERS .....	1246
Inverter-Driven Heat Pumps for Hydronic Systems, H. HALOZAN .....	1835
Investigation of Heat Transfer and Pressure Drop Augmentation for Turbulent Flow in Spirally Enhanced Tubes, S. GARIMELLA, V. CHANDRACHOOD, R.N. CHRISTENSEN, D.E. RICHARDS .....	1269
Irreversibility Analysis of Chilled Water Cooling Coils, An, D. MIRTH, D.C. HITTLE, D.W. SENSER .....	1119
<b>L</b>	
Laboratory Building HVAC Systems Optimization, V.A. NEUMAN, H.M. GUVEN .....	432
Laboratory Determination of the Thermal Resistance of Glazing Units, A.H. ELMAHDY, R.P. BOWEN .....	1301
Laboratory Examination and Seasonal Analyses of the Dynamic Losses for a Continuously Variable-Speed Heat Pump, W.A. MILLER .....	1246
<b>M</b>	
Liquid Desiccant Hybrids—Complexity Made Simple, W.H. WILKINSON .....	1895
Load Calculations for 200,640 Zones (RP-472), E.F. SOWELL .....	1229
Measurement of Field Thermal Performance Parameters of Building Envelope Components, C.E. COURVILLE, J.V. BECK .....	1595
Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with an Acoustic Velocity Sensor (RP-356), J.J. BAUSTIAN, M.B. PATE, A.E. BERGLES .....	602
Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Bypass Viscometer (RP-356), J.J. BAUSTIAN, M.B. PATE, A.E. BERGLES .....	588
Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Vibrating U-Tube Densimeter (RP-356), J.J. BAUSTIAN, M.B. PATE, A.E. BERGLES .....	571
Mechanical Contracting at a State College: A New Dimension in Education, T.A. CHERUKARA .....	1363
Monitoring Data Yield Enhancement by Advanced Real-Time Data Compaction Algorithms, L.A. LAMBERT .....	901
<b>N</b>	
New Method to Correlate and Predict Vapor-Liquid Equilibrium Data for Salt Solutions to be Used for Heat Pump Simulations, M.V. RANE, S.B. LALVANI, W.A. HELMER .....	2078
New Ventilation Efficiency Scales Based on Spatial Distribution of Contaminant Concentration Aided by Numerical Simulation, S. KATO, S. MURAKAMI .....	309
Numerical and Experimental Study on Turbulent Diffusion Fields in Conventional Flow Type Clean Rooms, S. MURAKAMI, S. KATO, Y. SUYAMA .....	469
Numerical Fits of the Properties of Lithium-Bromide Water Solutions, M.R. PATTERSON, H. PEREZ-BLANCO .....	2059
<b>O</b>	
Operating Experiences of a Refrigerant Recovery Services Company, D.R. O'MEARA .....	2152
Optimal Comfort Control for Variable-Speed Heat Pumps, J.W. MacARTHUR, E.W. GRALD .....	1283
Optimal Location of a District Heating Pipeline in a Rectangular Trench Filled with Insulating Spheres, R.F. BABUS'HAQ, S.D. PROBERT, L.M. DALY .....	1562
Optimizing Chiller Plant Energy Savings Using Adaptive DDC Algorithms, M.A. CASCIA .....	1937
Optimum Preinsulated Pipe Systems for Heating and Cooling, K. TOTTRUP .....	1531
<b>P</b>	
Parametric Study of Combined Economizer-Heat Reclaim Systems, R.H. HOWELL, H.J. SAUER, JR. .....	1895
Performance Evaluation of the Effects of a Group of Turbulator Inserts on Heat Transfer from Gases in Tubes, G.H. JUNKHAN, A.E. BERGLES, V. NIRMALAN, W. HANNO .....	1195
Performance of a Run-Around Heat Recovery System Using Aqueous Glycol as a Coupling Liquid, The, B.I. FORSYTH, R.W. BESANT .....	532
Potential for Space Conditioning Energy Savings in Metal Warehouses, A.N. TULUCA, T. VONIER .....	1818
Power Cost Comparisons: Evaporative Vs. Refrigerative Cooling, J.R. WATT .....	1108
Predictive Control Algorithm for Massive Buildings, A.K. ATHIENITIS .....	1050
Premises Distribution Systems in Intelligent Buildings, E.O. KAINLAURI .....	1023
Proposal for a Hybrid Desiccant Air-Conditioning System, I.L. MACLAINE-CROSS .....	1997

**R**

- Reclaiming Refrigerant in OEM Plants, R.W. PARKER .....
- Recovery of CFC Refrigerants during Service and Recycling by the Filtration Method, K.W. MANZ .....
- Relation between Hourly Diffuse Solar Radiation and Hourly Global Radiation as Affected by Ground Cover, The, W.T. KIERKUS, W.G. COLBORNE .....
- Resistance Approach to Estimating Airflow through Buildings with Large Openings Due to Wind, A, R.M. AYNSLEY .....
- Reviving the Double Duct Design Concept, P. ROJESKI .....

**S**

- Simplified Model for Predicting Cumulative Sensible Cooling Loads, A, D.M. BURCH, A.H. FANNEY, B.A. LICITRA .....
- Simulation of Dehumidification Characteristics of Residential Central Air Conditioners, S. KATIPAMULA, D.L. O'NEAL, S. SOMASUNDARAM .....
- Single-Loop Digital Controllers in HVAC, D.M. SCHWENK .....
- Solar Heating Teaching Tool Based on the F-Chart Method, A, E.T. BÖRER, H.G. LORSCH .....
- Study to Categorize Walls and Roofs on the Basis of Thermal Response, A (RP-472), S.M. HARRIS, F.C. McQUISTON .....
- Summary of Tested Glazing U-Values and the Case for an Industry-Wide Testing Program, A, J.F. HOGAN .....

**T**

- T-Method Duct Design, Part I: Optimization Theory (RP-516), R.J. TSAL, H.F. BEHLS, R. MANGEL .....
- T-Method Duct Design, Part II: Calculation Procedure and Economic Analysis (RP-516), R.J. TSAL, H.F. BEHLS, R. MANGEL .....
- Temperature Measurement of Glass Subjected to Solar Radiation, S.T. LIU .....
- Testing of a Passive Solar Window Heater, The, R.P. KIRCHNER, J.J. GARFALL .....
- Thermal Bridges and Standardization, PG. STAELENS .....
- Thermal Insulation and Contact Resistance in Metal-Framed Panels, H.A. TRETHOWEN .....
- Thermal Performance Analysis of Finned Tube Heat Exchangers at Low Temperatures and Airflow Rates, P.J. O'NEILL and R.R. CRAWFORD .....
- Thermal Performance of Radiant Heating Panels, R. ZMEUREANU, P.P. FAZIO, F. HAGHIGHAT .....
- Thermal Transmittance of Opaque Building Assemblies, T.B. JAMES, W.P. GOSS .....
- Thermodynamic Diagrams for Refrigerant Mixtures, J.S. GALLAGHER, M.O. MCCLINDE, G. MORRISON .....
- Thermodynamic Properties of a New Stratospherically Safe Working Fluid—Refrigerant 134a, D.P. WILSON, R.S. BASU .....
- Twenty Years' Experience with Variable Speed Pumps on Hot and Chilled Water Systems, J.B. RISHEL .....
- Two-Phase Refrigerant Flow Measurement with Liquid and Vapor Separation Technique, V.C. MEI .....

**U**

- Use of Fiberglass Piping Systems in a District Cooling Application, The, K.J. OSWALD, G.R. WESTFALL .....
- Use of Spreadsheets in Energy Estimating Methods, D.C. ZIETLOW, D.P. MEHTA .....
- Using In-Situ Thermal Performance Data to Improve Accuracy in Calculating Design Heat Transmission Coefficients, A.O. DESJARLAIS, R.P. TYE .....

**V**

- Vapor Liquid Equilibrium (VLE) and Enthalpy-Concentration-Temperature (H-X-T) Correlations for Ternary Nitrate Mixtures, M.R. ALLY .....
- Variable-Speed Compressor Performance, O.K. RIEGGER .....
- Vertical Ground-Coupled Heat Pumps: System and Installation Equipment Design Projects, S.P. KAVANAUGH .....

**2139****2145****227****1661****66****151****829****1985****1506****688****1317****90****112****1350****778****1793****1802****244****13****1747****2119****2095****1444****238****1557****1411****1613****631****1215****1469****W**

- Water Thermal Storage Tank: Part 1—Basic Design Concept and Storage Estimation for Multi-Connected Complete Mixing Tanks, N. NAKAHARA, K. SAGARA .....
- Water Thermal Storage Tank: Part 2—Mixing Model and Storage Estimation for Temperature-Stratified Tanks, N. NAKAHARA, K. SAGARA, M. TSUJIMOTO .....
- Water Thermal Storage Tank: Part 3—Storage Estimation, Applications of Self-Balanced Stratified Tanks, N. NAKAHARA, M. OKUMIYA .....
- Whole-House Simulation of Foundation Heat Flows Using the DOE2.1C Program, Y.J. HUANG, L.S. SHEN, J. BULL, L. GOLDBERG .....

346

371

395

936

**Authors****A**

- AGARWAL, J.K., R.J. REMIARZ, B.R. JOHNSON, Filter Testing with Submicrometer Aerosols .....
- AKBARI, H., K.E. HEINEMEIER, D. FLORA, P. LECONIAC, Analysis of Commercial Whole-Building 15-Minute-Interval Electric Load Data .....
- ALISSI, M.S., S. RAMADHYANI, R.J. SCHOENHALS, Effects of Ambient Temperature, Ambient Humidity, and Door Openings on Energy Consumption of a Household Refrigerator-Freezer .....
- ALLY, M.R., Vapor Liquid Equilibrium (VLE) and Enthalpy-Concentration-Temperature (H-X-T) Correlations for Ternary Nitrate Mixtures .....
- ANAND, G., R.N. CHRISTENSEN, D.E. RICHARDS, Forced Convection Condensation of Ammonia inside Coiled Fluted Tubes .....
- ARASTEH, D.K., R. SULLIVAN, K.M. PAPAMICHAEL, J.J. KIM, R.L. JOHNSON, S.E. SELKOWITZ, R. MCCLUNEY, An Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings .....
- ARENS, E.A., F.S. BAUMAN, D.R. ERNEST, The Effects of Surrounding Buildings on Wind Pressure Distributions and Natural Ventilation in Long Building Rows .....
- ARENS, E.A., G.E. SCHILLER, F.S. BAUMAN, C. BENTON, M. FOUNTAIN, T. DOHERTY, A Field Study of Thermal Environments and Comfort in Office Buildings (RP-462) .....
- ATHENITIS, A.K., A Predictive Control Algorithm for Massive Buildings .....
- AYNSLEY, R.M., A Resistance Approach to Estimating Airflow through Buildings with Large Openings Due to Wind .....
- AZER, N.Z., N. KAUSHIK, A General Heat Transfer Correlation for Condensation Inside Internally Finned Tubes .....
- AZER, N.Z., N. KAUSHIK, Condensation Heat Transfer Enhancement by Doubly Augmented Tubes .....

1850

855

1713

631

1132

673

1670

280

1050

1661

261

1159

**B**

- BABUS'HAQ, R.F., S.D. PROBERT, L.M. DALY, Optimal Location of a District Heating Pipeline in a Rectangular Trench Filled with Insulating Spheres .....
- BASU, R.S., D.P. WILSON, Thermodynamic Properties of a New Stratospherically Safe Working Fluid—Refrigerant 134a .....
- BAUMAN, F.S., D.R. ERNEST, E.A. ARENS, The Effects of Surrounding Buildings on Wind Pressure Distributions and Natural Ventilation in Long Building Rows .....
- BAUMAN, F.S., G.E. SCHILLER, E.A. ARENS, C. BENTON, M. FOUNTAIN, T. DOHERTY, A Field Study of Thermal Environments and Comfort in Office Buildings (RP-462) .....
- BAUSTIAN, J.J., M.B. PATE, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with an Acoustic Velocity Sensor (RP-356) .....
- BAUSTIAN, J.J., M.B. PATE, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Bypass Viscometer (RP-356) .....

1562

2095

1670

280

602

588

BAUSTIAN, J.J., M.B. PATE, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Vibrating U-Tube Densimeter (RP-356) .....	571	CHRISTIAN, J.E., Foundation Futures: Energy Saving Opportunities Offered by ASHRAE Standard 90.2P .....	979		
BECK, J.V., C.E. COURVILLE, Measurement of Field Thermal Performance Parameters of Building Envelope Components .....	1595	CLARIDGE, D.E., M. KRARTI, Analytical Calculation Procedure for Underground Heat Losses .....	1003		
BEHLS, H.F., R.J. TSAL, Fallacy of the Static Regain Duct Design Method (RP-516) .....	76	COLBORNE, W.G., W.T. KIERKUS, The Relation between Hourly Diffuse Solar Radiation and Hourly Global Radiation as Affected by Ground Cover .....	227		
BEHLS, H.F., R.J. TSAL, R. MANGEL, T-Method Duct Design, Part I: Optimization Theory (RP-516) .....	90	COURVILLE, C.E., J.V. BECK, Measurement of Field Thermal Performance Parameters of Building Envelope Components .....	1595		
BEHLS, H.F., R.J. TSAL, R. MANGEL, T-Method Duct Design, Part II: Calculation Procedure and Economic Analysis (RP-516) .....	112	COUVILLION, R.J., M.W. LARSON, M.H. SOMERVILLE, Analysis of a Vapor-Compression Refrigeration System with Mechanical Subcooling .....	641		
BENTON, C., G.E. SCHILLER, E.A. ARENS, F.S. BAUMAN, M. FOUNTAIN, T. DOHERTY, A Field Study of Thermal Environments and Comfort in Office Buildings (RP-462)	280	CRAWFORD, R.R., An Experimental Laboratory Investigation of Second Law Analysis of a Vapor-Compression Heat Pump .....	1491		
BERGLES, A.E., J.J. BAUSTIAN, M.B. PATE, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with an Acoustic Velocity Sensor (RP-356) .....	602	CRAWFORD, R.R., P.J. O'NEILL, Thermal Performance Analysis of Finned Tube Heat Exchangers at Low Temperatures and Airflow Rates .....	244		
BERGLES, A.E., J.J. BAUSTIAN, M.B. PATE, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Bypass Viscometer (RP-356) .....	588	CROWLEY, R., S.F. MOUJAES, Effect of Axial Spacing Variation of Underground Pipe Loop on Condenser Heat Transfer .....	46		
D					
BERGLES, A.E., G.H. JUNKHAN, V. NIRMLAN, W. HANNO, Performance Evaluation of the Effects of a Group of Turbulator Inserts on Heat Transfer from Gases in Tubes .....	571	DALY, L.M., R.F. BABUS'HAQ, S.D. PROBERT, Optimal Location of a District Heating Pipeline in a Rectangular Trench Filled with Insulating Spheres .....	1562		
BERGLES, A.E., L.M. SCHLAGER, M.B. PATE, Evaporation and Condensation of Refrigerant-Oil Mixtures in a Low-Fin Tube .....	1195	DAVIES, M.G., Design Models to Handle Radiative and Convective Exchange in a Room .....	173		
BESANT, R.W., B.I. FORSYTH, The Design of a Run-Around Heat Recovery System .....	1176	DE'ROSSI, F., O. MANCA, R. MASTRULLO, P. MAZZEI, Energy-Enthalpy Diagrams of R-503 and R-502 and Their Application .....	2045		
BESANT, R.W., B.I. FORSYTH, The Performance of a Run-Around Heat Recovery System Using Aqueous Glycol as a Coupling Liquid .....	511	DEGUNDA, N.A., Energy Optimization in a Hospital by Means of DDC .....	1969		
BONG, T.Y., M.N.A. HAWLADER, W. MAHMOOD, Influence of Expansion Device on the Performance of an Air-Conditioner with a Desuperheater .....	532	DESJARLAIS, A.O., R.P. TYE, Using In-Situ Thermal Performance Data to Improve Accuracy in Calculating Design Heat Transmission Coefficients .....	1613		
BORER, E.T., H.G. LORSCH, A Solar Heating Teaching Tool Based on the F-Chart Method .....	661	DOHERTY, T., G.E. SCHILLER, E.A. ARENS, F.S. BAUMAN, C. BENTON, M. FOUNTAIN, A Field Study of Thermal Environments and Comfort in Office Buildings (RP-462) .....	280		
BOWEN, R.P., A.H. ELMAHDY, Laboratory Determination of the Thermal Resistance of Glazing Units .....	1506	DONA, C.L.G., W.E. STEWART, JR., Development of Improved IceMaking Techniques for Storage Heat Pumps (RP-483) .....	419		
BULL, J., Y.J. HUANG, L.S. SHEN, L. GOLDBERG, Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program .....	1301	E			
BURCH, D.M., A.H. FANNEY, B.A. LICITRA, A Simplified Model for Predicting Cumulative Sensible Cooling Loads	936	ELMAHDY, A.H., R.P. BOWEN, Laboratory Determination of the Thermal Resistance of Glazing Units .....	1301		
BUSHBY, S.T., Application Layer Communication Protocols for Building Energy Management and Control Systems	151	EMERSON, D.T., D.I. TCHERNEV, High-Efficiency Regenerative Zeolite Heat Pump .....	2024		
F					
CARMODY, J.C., D.S. PARKER, Economic Optimization of Building Foundation Insulation Levels .....	494	ENSOR, D.S., J.T. HANLEY, L.E. SPARKS, Air Filter Particle-Size Efficiency Testing for Diameters Greater than 1 Micrometer .....	1859		
CARPENTER, S.C., J.P. KOKKO, Estimating Hot Water Use in Existing Commercial Buildings .....	959	ERNEST, D.R., F.S. BAUMAN, E.A. ARENS, The Effects of Surrounding Buildings on Wind Pressure Distributions and Natural Ventilation in Long Building Rows .....	1670		
CARRASCO, A.D., S. SOMASUNDARAM, An Experimental and Numerical Modeling of a Roof-Spray Cooling System .....	3	ETO, J.H., C. MEYER, The HVAC Costs of Increased Fresh Air Ventilation Rates in Office Buildings .....	331		
CASCIA, M.A., Optimizing Chiller Plant Energy Savings Using Adaptive DDC Algorithms .....	1091	EUNILKIM, D.H., Basis and Formalism of Room Weighting Factors—Thermal Discrete Transfer Functions of a Single Zone Model .....	215		
CHANDRACHOOD, V., S. GARIMELLA, R.N. CHRISTENSEN, D.E. RICHARDS, Investigation of Heat Transfer and Pressure Drop Augmentation for Turbulent Flow in Spirally Enhanced Tubes .....	1937	FANNEY, A.H., D.M. BURCH, B.A. LICITRA, A Simplified Model for Predicting Cumulative Sensible Cooling Loads	151		
CHERUKARA, T.A., Mechanical Contracting at a State College: A New Dimension in Education .....	1119	FAZIO, P.P., M. TURAGA, S. LIN, Correlations for Heat Transfer and Pressure Drop Factors for Direct Expansion Air Cooling and Dehumidifying Coils .....	616		
CHILDS, K.W., Analysis of Seven Thermal Bridges Identified in a Commercial Building .....	1363	FAZIO, P.P., R. ZMEUREANU, F. HAGHIGHAT, Thermal Performance of Radiant Heating Panels .....	13		
CHRISTENSEN, R.N., G. ANAND, D.E. RICHARDS, Forced Convection Condensation of Ammonia inside Coiled Fluted Tubes .....	1776	FLORA, D., H. AKBARI, K.E. HEINEMEIER, P. LECONIAC, Analysis of Commercial Whole-Building 15-Minute-Interval Electric Load Data .....	855		
CHRISTENSEN, R.N., S. GARIMELLA, V. CHANDRACHOOD, D.E. RICHARDS, Investigation of Heat Transfer and Pressure Drop Augmentation for Turbulent Flow in Spirally Enhanced Tubes .....	1132	2194	2194		

FORSYTH, B.I., R.W. BESANT, The Design of a Run-Around Heat Recovery System	511
FORSYTH, B.I., R.W. BESANT, The Performance of a Run-Around Heat Recovery System Using Aqueous Glycol as a Coupling Liquid	532
FOUNTAIN, M., G.E. SCHILLER, E.A. ARENS, F.S. BAUMAN, C. BENTON, T. DOHERTY, A Field Study of Thermal Environments and Comfort in Office Buildings (RP-462)	280
 <b>G</b>	
GALLAGHER, J.S., M.O. MCILINDEN, G. MORRISON, Thermodynamic Diagrams for Refrigerant Mixtures	2119
GARFALL, J.J., R.P. KIRCHNER, The Testing of a Passive Solar Window Heater	778
GARIMELLA, S., V. CHANDRACHOOD, R.N. CHRISTENSEN, D.E. RICHARDS, Investigation of Heat Transfer and Pressure Drop Augmentation for Turbulent Flow in Spatially Enhanced Tubes	1119
GOLDBERG, L., Y.J. HUANG, L.S. SHEN, J. BULL, Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program	936
GOSS, W.P., T.B. JAMES, Thermal Transmittance of Opaque Building Assemblies	1747
GRALD, E.W., J.W. MACARTHUR, Optimal Comfort Control for Variable-Speed Heat Pumps	1283
GRIGGS, E.I., P.H. SHIPP, The Impact of Surface Reflectance on the Thermal Performance of Roofs: An Experimental Study	1626
GUVEN, H.M., V.A. NEUMAN, Laboratory Building HVAC Systems Optimization	432
GUVEN, H.M. V.A. NEUMAN, F. SAJED, A Comparison of Cooling Thermal Storage and Gas Air Conditioning for a Lab Building	452
 <b>H</b>	
HAGHIGHAT, F., R. ZMEUREANU, P.P. FAZIO, Thermal Performance of Radiant Heating Panels	13
HALOZAN, H., Inverter-Driven Heat Pumps for Hydronic Systems	1269
HANLEY, J.T., D.S. ENSOR, L.E. SPARKS, Air Filter Particle-Size Efficiency Testing for Diameters Greater than 1 Micrometer	1859
HANNO, W., G.H. JUNKHAN, A.E. BERGLES, V. NIRMAN, Performance Evaluation of the Effects of a Group of Turbulator Inserts on Heat Transfer from Gases in Tubes	1195
HARRIS, S.M., F.C. MCQUISTON, A Study to Categorize Walls and Roofs on the Basis of Thermal Response (RP-472)	688
HASSAB, M.A., W.A. KAMAL, An Improved Model for the Design of Plain Tube Air Cooling and Dehumidifying Coils	792
HAWLADER, M.N.A., T.Y. BONG, W. MAHMOOD, Influence of Expansion Device on the Performance of an Air-Conditioner with a Desuperheater	661
HEDLIN, C.P., Heat Flow through a Roof Insulation Having Moisture Contents between 0 and 1 by Volume, in Summer	1579
HEINEMEIER, K.E., H. AKBARI, D. FLORA, P. LECONIAC, Analysis of Commercial Whole-Building 15-Minute-Interval Electric Load Data	955
HEINEMEIER, K.E., A.K. MEIER, Energy use of Residential Refrigerators: A Comparison of Laboratory and Field Use	1737
HELMER, W.A., M.V. RANE, S.B. LALVANI, New Method to Correlate and Predict Vapor-Liquid Equilibrium Data for Salt Solutions to be Used for Heat Pump Simulations	2078
HEROLD, K., R. RADERMACHER, Computer Software in HVAC Education: A Case Study	1478
HEYDARI, A., I. TURIEL, Analysis of Design Options to Improve the Efficiency of Refrigerator-Freezers and Freezers	1699
HITTLE, D.C., D. MIRTH, D.W. SENSER, An Irreversibility Analysis of Chilled Water Cooling Coils	560
 <b>I</b>	
HOGAN, J.F., A Summary of Tested Glazing U-Values and the Case for an Industry-Wide Testing Program	1317
HOWELL, R.H., H.J. SAUER, JR., Design Guidelines for Use of an Economizer with Heat Recovery	1877
HOWELL, R.H., H.J. SAUER, JR., Evolution of HVAC Education at One University	1370
HOWELL, R.H., H.J. SAUER, JR., Parametric Study of Combined Economizer-Heat Reclaim Systems	1895
HUANG, Y.J., L.S. SHEN, J. BULL, L. GOLDBERG, Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program	936
HUANG, Y.J., L.S. SHEN, J. POLIAKOVA, Calculation of Building Foundation Heat Loss Using Superposition and Numerical Scaling	917
 <b>J</b>	
IBAMOTO, T., T. INOUE, T. KAWASE, S. TAKAKUSA, Y. MATSUO, The Development of an Optimal Control System for Window Shading Devices Based on Investigations in Office Buildings	1034
INOUE, T., T. KAWASE, T. IBAMOTO, S. TAKAKUSA, Y. MATSUO, The Development of an Optimal Control System for Window Shading Devices Based on Investigations in Office Buildings	1034
 <b>K</b>	
KAINLAURI, E.O., Premises Distribution Systems in Intelligent Buildings	1023
KAKAC, S., S.A. SHERIF, S. SENGUPTA, T. OLSEN, Improving HVAC Education—A Case Study	1390
KAMAL, W.A., M.A. HASSAB, An Improved Model for the Design of Plain Tube Air Cooling and Dehumidifying Coils	792
KATIPAMULA, S., D.L. O'NEAL, S. SOMASUNDARAM, Simulation of Dehumidification Characteristics of Residential Central Air Conditioners	829
KATO, S., S. MURAKAMI, New Ventilation Efficiency Scales Based on Spatial Distribution of Contaminant Concentration Aided by Numerical Simulation	309
KATO, S., S. MURAKAMI, Y. SUYAMA, Numerical and Experimental Study on Turbulent Diffusion Fields in Conventional Flow Type Clean Rooms	469
KAUSHIK, N., N.Z. AZER, A General Heat Transfer Correlation for Condensation Inside Internally Finned Tubes	261
KAUSHIK, N., N.Z. AZER, Condensation Heat Transfer Enhancement by Doubly Augmented Tubes	1159
KAVANAUGH, S.P., Vertical Ground-Coupled Heat Pumps: System and Installation Equipment Design Projects	1469
KAWASE, T., T. INOUE, T. IBAMOTO, S. TAKAKUSA, Y. MATSUO, The Development of an Optimal Control System for Window Shading Devices Based on Investigations in Office Buildings	1034
KIERKUS, W.T., W.G. COLBORNE, The Relation between Hourly Diffuse Solar Radiation and Hourly Global Radiation as Affected by Ground Cover	227

KIM, J.J., R. SULLIVAN, D.K. ARASTEH, K.M. PAPAMICHAEL, R.L. JOHNSON, S.E. SELKOWITZ, R. MCCLUNEY, An Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings	673	MAZZEI, P., F. DE'ROSSI, O. MANCA, R. MASTRULLO, Energy-Enthalpy Diagrams of R-503 and R-502 and Their Application	2045
KIRCHNER, R.P., J.J. GARFALL, The Testing of a Passive Solar Window Heater	778	McCLELLAN, C.H., Estimated Temperature Performance for Evaporative Cooling Systems in Five Locations in the United States	1071
KOKKO, J.P., S.C. CARPENTER, Estimating Hot Water Use in Existing Commercial Buildings	3	MCCLUNEY, R., R. SULLIVAN, D.K. ARASTEH, K.M. PAPAMICHAEL, J.J. KIM, R.L. JOHNSON, S.E. SELKOWITZ, An Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings	673
KRAFTHEFER, B.C., Effect of Filtration on Particle Size Distribution	1866	McFARLAN, A.I., Experience with Economizer Applications in Heat Recovery-Heat Pump Systems: The Positive and the Negative	1918
KRARTI, M., D.E. CLARIDGE, Analytical Calculation Procedure for Underground Heat Losses	1003	McLINDEN, M.O., J.S. GALLAGHER, G. MORRISON, Thermodynamic Diagrams for Refrigerant Mixtures	2119
KUIPERS, L.J.M., M.J.P. JANSEN, P.J.M. VERBOVEN, The Influence of the Refrigerant Charge on the Functioning of Small Refrigerating Appliances	813	McQUISTON, F.C., S.M. HARRIS, A Study to Categorize Walls and Roofs on the Basis of Thermal Response (RP-472)	688
<b>L</b>			
LALVANI, S.B., M.V. RANE, W.A. HELMER, New Method to Correlate and Predict Vapor-Liquid Equilibrium Data for Salt Solutions to be Used for Heat Pump Simulations	2078	MECKLER, G., Efficient Integration of Desiccant Cooling in Commercial HVAC Systems	2033
LAMBERT, L.A., Monitoring Data Yield Enhancement by Advanced Real-Time Data Compaction Algorithms	901	MEHTA, D.P., D.C. ZIELLOW, Use of Spreadsheets in Energy Estimating Methods	1411
LARSON, M.W., R.J. COUVILLION, M.H. SOMERVILLE, Analysis of a Vapor-Compression Refrigeration System with Mechanical Subcooling	641	MEI, V.C., Two-Phase Refrigerant Flow Measurement with Liquid and Vapor Separation Technique	238
LECONIAC, P., H. AKBARI, K.E. HEINEMEIER, D. FLORA, Analysis of Commercial Whole-Building 15-Minute-Interval Electric Load Data	855	MEIER, A.K., K.E. HEINEMEIER, Energy use of Residential Refrigerators: A Comparison of Laboratory and Field Use	1737
LEXEN, T.C., Development and Use of a Window Field Comparison Facility	1338	MEREDITH, D.B., Current Demand for HVAC&R Graduates	1400
LICITRA, B.A., D.M. BURCH, A.H. FANNEY, A Simplified Model for Predicting Cumulative Sensible Cooling Loads	151	MEYER, C., J.H. ETO, The HVAC Costs of Increased Fresh Air Ventilation Rates in Office Buildings	331
LIDDAMENT, M.W., The Calculation of Wind Effect on Ventilation	1645	MEYER, J.F., M.M. OHADI, C.F. JACOBS, Instructional Use of a Simplified Building Energy Analysis Computational Model	1513
LIN, S., M. TURAGA, P.P. FAZIO, Correlations for Heat Transfer and Pressure Drop Factors for Direct Expansion Air Cooling and Dehumidifying Coils	616	MILLER, W.A., Laboratory Examination and Seasonal Analyses of the Dynamic Losses for a Continuously Variable-Speed Heat Pump	1246
LINTON, J.W., Economics, Testing, and Evaluation of an Exhaust Air Heat Pump for R-2000 (Tight) Houses	28	MIRTH, D., D.C. HITTLE, D.W. SENSER, An Irreversibility Analysis of Chilled Water Cooling Coils	560
LIU, S.T., Temperature Measurement of Glass Subjected to Solar Radiation	1350	MORRISON, G., J.S. GALLAGHER, M.O. McLINDEN, Thermodynamic Diagrams for Refrigerant Mixtures	2119
LORSCH, H.G., E.T. BORER, A Solar Heating Teaching Tool Based on the F-Chart Method	1506	MOUJAES, S.F., R. CROWLEY, Effect of Axial Spacing Variation of Underground Pipe Loop on Condenser Heat Transfer	46
<b>M</b>			
MacARTHUR, J.W., E.W. GRALD, Optimal Comfort Control for Variable-Speed Heat Pumps	1283	MURAKAMI, S., S. KATO, New Ventilation Efficiency Scales Based on Spatial Distribution of Contaminant Concentration Aided by Numerical Simulation	309
MACLAINE-CROSS, I.L., Proposal for a Hybrid Desiccant Air-Conditioning System	1997	MURAKAMI, S., S. KATO, Y. SUYAMA, Numerical and Experimental Study on Turbulent Diffusion Fields in Conventional Flow Type Clean Rooms	469
MAHMOOD, W., T.Y. BONG, M.N.A. HAWLADER, Influence of Expansion Device on the Performance of an Air-Conditioner with a Desuperheater	661	<b>N</b>	
MANCA, O., F. DE'ROSSI, R. MASTRULLO, P. MAZZEI, Energy-Enthalpy Diagrams of R-503 and R-502 and Their Application	2045	NAKAHARA, N., M. OKUMIYA, Water Thermal Storage Tank: Part 3—Storage Estimation, Applications of Self-Balanced Stratified Tanks	395
MANGEL, R., R.J. TSAL, H.F. BEHLS, T-Method Duct Design, Part I: Optimization Theory (RP-516)	90	NAKAHARA, N., K. SAGARA, Water Thermal Storage Tank: Part 1—Basic Design Concept and Storage Estimation for Multi-Connected Complete Mixing Tanks	346
MANGEL, R., R.J. TSAL, H.F. BEHLS, T-Method Duct Design, Part II: Calculation Procedure and Economic Analysis (RP-516)	112	NAKAHARA, N., K. SAGARA, M. TSUJIMOTO, Water Thermal Storage Tank: Part 2—Mixing Model and Storage Estimation for Temperature-Stratified Tanks	371
MANNION, G.F., High Temperature Rise Piping Design for Variable Volume Systems: Key to Chiller Energy Management	1427	NEUMAN, V.A., H.M. GUVEN, Laboratory Building HVAC Systems Optimization	432
MANZ, K.W., Recovery of CFC Refrigerants during Service and Recycling by the Filtration Method	2145	NEUMAN, V.A., F. SAJED, H.M. GUVEN, A Comparison of Cooling Thermal Storage and Gas Air Conditioning for a Lab Building	452
MARSH, C.W., DDC Systems for Pressurization, Fume Hood Face Velocity and Temperature Control in Variable Air Volume Laboratories	1947	NIRMALAN, V., G.H. JUNKHAN, A.E. BERGLES, W. HANNO, Performance Evaluation of the Effects of a Group of Turbulator Inserts on Heat Transfer from Gases in Tubes	1195
MASTRULLO, R., F. DE'ROSSI, O. MANCA, P. MAZZEI, Energy-Enthalpy Diagrams of R-503 and R-502 and Their Application	2045	<b>O</b>	
MATSUO, Y., T. INOUE, T. KAWASE, T. IBAMOTO, S. TAKAKUSA, The Development of an Optimal Control System for Window Shading Devices Based on Investigations in Office Buildings	1034	O'MEARA, D.R., Operating Experiences of a Refrigerant Recovery Services Company	2152
		O'NEAL, D.L., S. KATIPAMULA, S. SOMASUNDARAM, Simulation of Dehumidification Characteristics of Residential Central Air Conditioners	829

O'NEILL, P.J., R.R. CRAWFORD, Thermal Performance Analysis of Finned Tube Heat Exchangers at Low Temperatures and Airflow Rates	244	RICHARDS, D.E., S. GARIMELLA, V. CHANDRACHOOD, R.N. CHRISTENSEN, Investigation of Heat Transfer and Pressure Drop Augmentation for Turbulent Flow in Spatially Enhanced Tubes	1119
OHADI, M.M., J.R. MEYER, C.F. JACOBS, Instructional Use of a Simplified Building Energy Analysis Computational Model	1513	RIEGGER, O.K., Variable-Speed Compressor Performance	1215
OKUMIYA, M., N. NAKAHARA, Water Thermal Storage Tank: Part 3—Storage Estimation, Applications of Self-Balanced Stratified Tanks	395	RISHEL, J.B., Twenty Years' Experience with Variable Speed Pumps on Hot and Chilled Water Systems	1444
OLSEN, T., S.A. SHERIF, S. SENGUPTA, S. KAKAC, Improving HVAC Education—A Case Study	1390	RIVERS, R.D., Interpretation and Use of Air Filter Particle-Size-Efficiency Data for General-Ventilation Applications	1835
OSWALD, K.L., G.R. WESTFALL, The Use of Fiberglass Piping Systems in a District Cooling Application	1557	ROGERS, E.A., D.F. RECK, Determination of Conservation Potential Through End-Use Metering for a Wisconsin Utility's "Smart Money Program"	872
		ROJESKI, P., Reviving the Double Duct Design Concept	66
		RUCHONIEMI, T.J., Measured Efficiency of Variable-Speed Drives in Heat Pumps	1229
<b>P</b>			
PAPAMICHAEL, K.M., D.K. ARASTEH, R. SULLIVAN, J.J. KIM, R.L. JOHNSON, S.E. SELKOWITZ, R. MCCLUNEY, An Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings	673	SAGARA, K., N. NAKAHARA, Water Thermal Storage Tank: Part 1—Basic Design Concept and Storage Estimation for Multi-Connected Complete Mixing Tanks	346
PARKER, D.S., J.C. CARMODY, Economic Optimization of Building Foundation Insulation Levels	959	SAGARA, K., N. NAKAHARA, M. TSUJIMOTO, Water Thermal Storage Tank: Part 2—Mixing Model and Storage Estimation for Temperature-Stratified Tanks	371
PARKER, R.W., Reclaiming Refrigerant in OEM Plants	2139	SAJED, F., V.A. NEUMAN, H.M. GUVEN, A Comparison of Cooling Thermal Storage and Gas Air Conditioning for a Lab Building	452
PATE, M.B., J.J. BAUSTIAN, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with an Acoustic Velocity Sensor (RP-356)	602	SAUER, H.J., JR., R.H. HOWELL, Design Guidelines for Use of an Economizer with Heat Recovery	1877
PATE, M.B., J.J. BAUSTIAN, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Bypass Viscometer (RP-356)	588	SAUER, H.J., JR., R.H. HOWELL, Evolution of HVAC Education at One University	1370
PATE, M.B., J.J. BAUSTIAN, A.E. BERGLES, Measuring the Concentration of a Flowing Oil-Refrigerant Mixture with a Vibrating U-Tube Densimeter (RP-356)	2059	SAUER, H.J., JR., R.H. HOWELL, Parametric Study of Combined Economizer-Heat Reclaim Systems	1895
PATE, M.B., L.M. SCHLAGER, A.E. BERGLES, Evaporation and Condensation of Refrigerant-Oil Mixtures in a Low-Fin Tube	2059	SCHILLER, G.E., E.A. ARENS, F.S. BAUMAN, C. BENTON, M. FOUNTAIN, T. DOHERTY, K. CRAIK, A Field Study of Thermal Environments and Comfort in Office Buildings (RP-462)	280
PATTERSON, M.R., H. PEREZ-BLANCO, Numerical Fits of the Properties of Lithium-Bromide Water Solutions	1176	SCHLAGER, L.M., M.B. PATE, A.E. BERGLES, Evaporation and Condensation of Refrigerant-Oil Mixtures in a Low-Fin Tube	1176
PEREZ-BLANCO, H., M.R. PATTERSON, Numerical Fits of the Properties of Lithium-Bromide Water Solutions	917	SCHOENHALS, R.J., M.S. ALISSI, S. RAMADHYANI, Effects of Ambient Temperature, Ambient Humidity, and Door Openings on Energy Consumption of a Household Refrigerator-Freezer	1713
POLIAKOVA, J., L.S. SHEN, Y.J. HUANG, Calculation of Building Foundation Heat Loss Using Superposition and Numerical Scaling	1562	SCHWENK, D.M., Single-Loop Digital Controllers in HVAC	1985
PROBERT, S.D., R.F. BABUS'HAQ, L.M. DALY, Optimal Location of a District Heating Pipeline in a Rectangular Trench Filled with Insulating Spheres	196	SELKOWITZ, S.E., R. SULLIVAN, D.K. ARASTEH, K.M. PAPAMICHAEL, J.J. KIM, R.L. JOHNSON, R. MCCLUNEY, An Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings	673
		SENGUPTA, S., S.A. SHERIF, S. KAKAC, T. OLSEN, Improving HVAC Education—A Case Study	1390
<b>Q</b>			
QINGYAN, C., J. VAN DER KOOI, ACCURACY—A Program for Combined Problems of Energy Analysis, Indoor Airflow, and Air Quality	1478	SENSTER, D.W., D. MIRTH, D.C. HITTLE, An Irreversibility Analysis of Chilled Water Cooling Coils	560
<b>R</b>			
RADERMACHER, R., K.E. HEROLD, Computer Software in HVAC Education: A Case Study	1713	SHEN, L.S., Y.J. HUANG, J. BULL, L. GOLDBERG, Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program	936
RAMADHYANI, S., M.S. ALISSI, R.J. SCHOENHALS, Effects of Ambient Temperature, Ambient Humidity, and Door Openings on Energy Consumption of a Household Refrigerator-Freezer	2078	SHEN, L.S., J. POLIAKOVA, Y.J. HUANG, Calculation of Building Foundation Heat Loss Using Superposition and Numerical Scaling	917
RANE, M.V., S.B. LALVANI, W.A. HELMER, New Method to Correlate and Predict Vapor-Liquid Equilibrium Data for Salt Solutions to be Used for Heat Pump Simulations	1850	SHERIF, S.A., S. SENGUPTA, S. KAKAC, T. OLSEN, Improving HVAC Education—A Case Study	1390
RECK, D.F., E.A. ROGERS, Determination of Conservation Potential Through End-Use Metering for a Wisconsin Utility's "Smart Money Program"	872	SHIPP, P.H., E.I. GRIGGS, The Impact of Surface Reflectance on the Thermal Performance of Roofs: An Experimental Study	1626
REMIARZ, R.J., B.R. JOHNSON, J.K. AGARWAL, Filter Testing with Submicrometer Aerosols	1132	SOMASUNDARAM, S., A.D. CARRASCO, An Experimental and Numerical Modeling of a Roof-Spray Cooling System	1091
RICHARDS, D.E., G. ANAND, R.N. CHRISTENSEN, Forced Convection Condensation of Ammonia inside Coiled Fluted Tubes		SOMASUNDARAM, S., S. KATIPAMULA, D.L. O'NEAL, Simulation of Dehumidification Characteristics of Residential Central Air Conditioners	829
		SOMERVILLE, M.H., R.J. COUVILLION, M.W. LARSON, Analysis of a Vapor-Compression Refrigeration System with Mechanical Subcooling	641
		SOWELL, E.F., Classification of 200,640 Parametric Zones for Cooling Load Calculations (RP-472)	754

SOWELL, E.F., Cross-Check and Modification of the DOE-2 Program for Calculation of Zone Weighting Factors (RP-472) . . . . .	737	TULUCA, A.N., T. VONIER, Potential for Space Conditioning Energy Savings in Metal Warehouses . . . . .	1818
SOWELL, E.F., Load Calculations for 200,640 Zones (RP-472) . . . . .	716	TURAGA, M., S. LIN, P.P. FAZIO, Correlations for Heat Transfer and Pressure Drop Factors for Direct Expansion Air Cooling and Dehumidifying Coils . . . . .	616
SPARKS, L.E., D.S. ENSOR, J.T. HANLEY, Air Filter Particle-Size Efficiency Testing for Diameters Greater than 1 Micrometer . . . . .	1859	TURIEL, I., A. HEYDARI, Analysis of Design Options to Improve the Efficiency of Refrigerator-Freezers and Freezers . . . . .	1699
STAELENS, P.G., Thermal Bridges and Standardization . . . . .	1793	TYE, R.P., A.O. DESJARLAIS, Using In-Situ Thermal Performance Data to Improve Accuracy in Calculating Design Heat Transmission Coefficients . . . . .	1613
STETHEM, W.C., Application of Constant Speed Pumps to Variable Volume Systems . . . . .	1458		
STEWARD, W.E., JR., C.L.G. DONA, Development of Improved IceMaking Techniques for Storage Heat Pumps (RP-483) . . . . .	419		V
SULLIVAN, H.F., J.L. WRIGHT, Glazing System U-Value Measurement Using a Guarded Heater Plate Apparatus . . . . .	1325	VAN DER KOOI, J., C. QINGYAN, ACCURACY—A Program for Combined Problems of Energy Analysis, Indoor Airflow, and Air Quality . . . . .	196
SULLIVAN, R., D.K. ARASTEH, K.M. PAPAMICHAEL, J.J. KIM, R.L. JOHNSON, S.E. SELKOWITZ, R. MCCCLUNEY, An Indices Approach for Evaluating the Performance of Fenestration Systems in Non-Residential Buildings . . . . .	673	VERBOVEN, P.J.M., L.J.M. KUIJPERS, M.J.P. JANSEN, The Influence of the Refrigerant Charge on the Functioning of Small Refrigerating Appliances . . . . .	813
SUYAMA, Y., S. MURAKAMI, S. KATO, Numerical and Experimental Study on Turbulent Diffusion Fields in Conventional Flow Type Clean Rooms . . . . .	469	VONIER, T., A.N. TULUCA, Potential for Space Conditioning Energy Savings in Metal Warehouses . . . . .	1818
			W
TAKAKUSA, S., T. INOUE, T. KAWASE, T. IBAMOTO, Y. MATSUO, The Development of an Optimal Control System for Window Shading Devices Based on Investigations in Office Buildings . . . . .	1034	WAKED, A.M., Evaluation of Evaporative Cooling for Dairy Cattle in Arid Climates . . . . .	57
TCHERNEV, D.I., D.T. EMERSON, High-Efficiency Regenerative Zeolite Heat Pump . . . . .	2024	WATT, J.R., Power Cost Comparisons: Evaporative Vs. Refrigerative Cooling . . . . .	1108
TOTTRUP, K., Optimum Preinsulated Pipe Systems for Heating and Cooling . . . . .	1531	WESTFALL, G.R., K.J. OSWALD, The Use of Fiberglass Piping Systems in a District Cooling Application . . . . .	1557
TRETHOWEN, H.A., Thermal Insulation and Contact Resistance in Metal-Framed Panels . . . . .	1802	WILKINSON, W.H., Liquid Desiccant Hybrids—Complexity Made Simple . . . . .	2010
TSAL, R.J., H.F. BEHLS, Fallacy of the Static Regain Duct Design Method (RP-516) . . . . .	76	WILSON, D.P., R.S. BASU, Thermodynamic Properties of a New Stratospherically Safe Working Fluid—Refrigerant 134a . . . . .	2095
TSAL, R.J., H.F. BEHLS, R. MANGEL, T-Method Duct Design, Part I: Optimization Theory (RP-516) . . . . .	90	WONG, V.T., Case Study of a Commercial Conservation Retrofit: Measured Results from a Grocery Store . . . . .	888
TSAL, R.J., H.F. BEHLS, R. MANGEL, T-Method Duct Design, Part II: Calculation Procedure and Economic Analysis (RP-516) . . . . .	112	WONG, Y.W., Energy Performance of Office Buildings in Singapore . . . . .	546
TSUJIMOTO, M., N. NAKAHARA, K. SAGARA, Water Thermal Storage Tank: Part 2—Mixing Model and Storage Estimation for Temperature-Stratified Tanks . . . . .	371	WRIGHT, J.L., H.F. SULLIVAN, Glazing System U-Value Measurement Using a Guarded Heater Plate Apparatus . . . . .	1325
			Z
		ZIETLOW, D.C., D.P. MEHTA, Use of Spreadsheets in Energy Estimating Methods . . . . .	1411
		ZMEUREANU, R., P.P. FAZIO, F. HAGHIGHAT, Thermal Performance of Radiant Heating Panels . . . . .	13

